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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXX NO. 10

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A DESIGN FOR WINTER

Better Crops with PLANT FOOD

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VOL. XXX WASHINGTON, D. C., DECEMBER 1946 No. 10

Remembering . . . . .

Sundry Other Sundays

Jeff McDermid

LAST SUNDAY when the elders passed us the collection plate it occurred to me suddenly how much more I was able to contribute in cash than I had left in youth and years compared to those other Sundays long ago. This reverie, I am afraid, intruded itself too fully between me and the text and sermon—but maybe it did me almost as much good as to have heard the pastor and been heedless of the present stark reality.

I cannot approach this topic with the saintly self-conscious aspect of the w. k. Pharisee, for my life has been a very open book for all my kith and kindred and my long-suffering neighbors—a book not embellished with "pretense and long prayers" or much decorated with heroism, piety, or charity. I have been humble enough to a fault, but humility and want of aggressiveness alone cannot be relied upon for a ticket to immortality.

Negative virtues are somewhat comfortless when seen from life's hilltop along toward sunset. If I had it to do over again, I'd pray for a little militancy to mix with mercy and forbearance, provided it was not expended in bigger business boosting or pressure group publicity.

At any rate, I tried to see myself and young companions of my generation as we were on sundry other Sundays—Sundays when the days seemed longer,

the nights shorter, and the ways of life and living easier, simpler, and (seemingly) more stabilized and secure.

First remembrance of Sunday concerns a basement classroom used for the juvenile and infant Christians—a place I was sent to at the earnest solicitation of my parents bv a buxom, capable church woman of talents, wife of the Sabbath school superintendent. She played the organ for all services and devoted her energy to the selection and distribution of colored golden text cards and little leaflets for the inspiration and guidance of our new and toddling minds.

Her husband was a bank-teller on weekdays and a sacred tenor soloist on Sundays. (I recall seeing my first picture of Caruso then and wondering if he could sing Onward Christian Soldiers as sweetly as "Chan," our S. S. man.) Chan was lithe, spry and kindly, verv human and none too godly out of Sabbatical assignments. He would have made a bang-up Rotarian, but he arrived too soon for membership. Awhile ago I saw Chan after an interval of much too many years—and that's when I really began to count the wrinkles in my own face and future. For Chan sang no more and his once erect and dashing figure had gone forever to the same unknown bourne with his wavy brown hair and stylish suits.

THUS do the darling idols of our infancy recede and leave us stranded against the shoals of time. All of which by way of saying that songs well sung, bright pictures, and lilting music and marching seem to linger longer as Sunday memories than any of the precepts and preachments they were designed to foster. I shall expect to shake hands with Chan and his Missus just outside the Heavenly choir loft and find out if he has any nicer chores on weekdays than counting other men's cash. (I might modify that with certain reservations relative to my own presence there.)

Taken in toto, that's just about the case with most of the recollected incidents of all those years spent in Sunday services from six to sixteen. To us who were really heathens amid the elder converts, Sunday partook of its prehistoric origin—that is, Sun-day was to us like the sun worship of the ancients—a time of basking in our vivid growing vigor and animal expansion, a good time to eat well, play hard, and take short rests from school-day routine, with little thought of the morrow or the days of the turbulent years too soon to come.

OUR leading hardware dealer's lady taught the older boys' Bible class, as much as she was able to, limited by her own shortcomings and our eagerness to chatter about athletics, pets, and bicycles. The only things that happened on regular schedule were the penny collections and the closing signal. Just a bit beyond us across the aisle were the high-school girls in Sunday raiments—whom we watched covertly or openly with many a sigh and snicker. I confess that my chief consolation for two hours in a pew at Sunday services was the chance to scan rows of bright eyes just visible above the outer rail of the choir, peering out at us provocatively below their pompadours. Ah me, oh my, "them was the happy days." But only a few scant texts from sacred tomes are left to keep these memories company.

Texts, hymns, prayers, and penances were but of fleeting and feeble moment when one was young and ardently hopeful of a future which bore no hint of weakness or failure or of becoming forgetful or forgotten. Certainly the church had its charms and Sunday its solace, but they partook of the mystery and the challenge and the dreams ahead, rather than of the miseries, the mistakes, and the burdens of something past and gone.

Verily, you lay something heavier

and harder in the elder's plate each Sunday at middle years and over than you ever did on those Sabbaths of your springtime. Yet in all this there lies some hopeful compensations, perhaps a wider knowledge of the values and

balances of life and maybe less perplexity about the real personal goal that should be sought. But as to its real meaning and its potential power no doubt we are no better off now than we were as young communicants.

We grope in that way still, despite all the material progress we have made during the intervening years of full achievement and sorry abomination. In those years we have as a people soared in the stratosphere without cutting one iota the awful distance between the plow and the stars, or pulling our feet from the mud upward toward the saints and angels. I rather doubt, however, if I ought to blame the old preachers and teachers of my Sabbath memory for this, our gross inadequacy. They just went down in temporary defeat before too much hot competition, that's all.

Time marches on, as they say, and so in due season my folks suggested to me that a boy approaching twenty-one should make his peace with eternity by public confession of faith and acceptance of church vows. I had not taken this thing very seriously as the teen-age interval rushed by me. In some ways I was still a pagan, only lacking the flute and the flowers to resemble a rollicking and carefree Pan.

Yet I succumbed to custom and the standards set by my family and made known my desire to begin paying tithes to the struggling parish. I only faintly recall the brief ceremony as Elder Lawson stood by my side while the preacher gave me the right hand of fellowship. I was, I remember, very weak in the joints and red of face before all the kids I had played hookey with and whom I had joined in lurid forays in apple orchards or tipping over backhouses on All Saints Eve. I believe that John Jones took the oath with me that Sunday morning, and six years later he was buried with military honors in Flanders Fields.

Joining lodges proved much more exciting to me in later years, but there is something to be said after all for the quiet simplicity of a church affiliation, where no horrid and meaningless penalties are invoked and where are handed to you the compass and rudder with which to guide and steer your untried craft through rapid floods and silent waters. Maybe they thought I was a better sailor than I really was, because they told me I was master of my fate and captain of my soul and then called upon the audience to sing, "Throw Out the Lifeline, Somebody's Sinking Today."

COURTSHIP Sundays and Newlywed Sabbaths are almost too divine to be dragged bodily into the public gaze. I'm not sure which phase of adoration and dual communion brings me happier memories—the unbelievable companionship in the pew before or after the nuptials. Being then in a romantic trance, neither of us can clearly testify. Neither can we recall the sermons. But we took heed when he read from Corinthians that "love beareth all things and endureth all things."

(*Turn to page* 50)

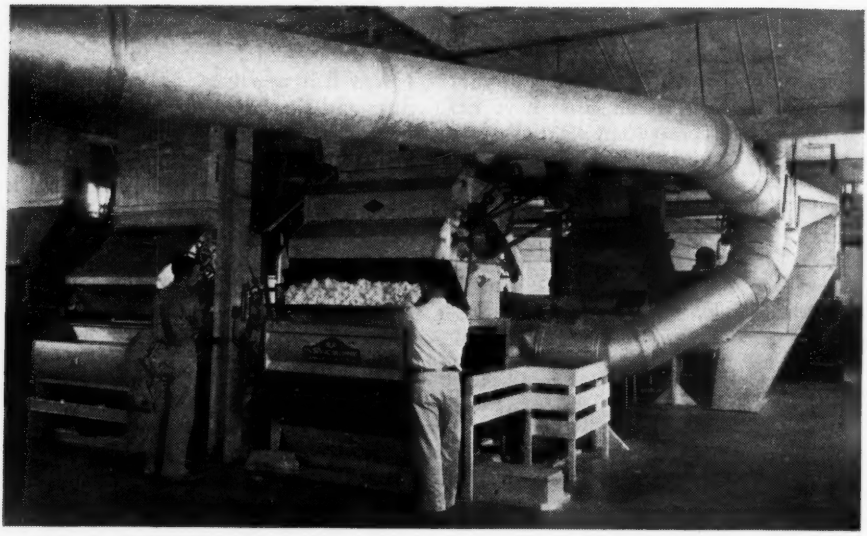


Fig. 1. Interior of experimental set-up in the U. S. Cotton Ginning Laboratory where all types of cleaning and extracting machines are tested. In recent years, emphasis has been placed on adapting and developing processes for cleaning mechanically picked cotton.

Farm Mechanization in Relation To Cotton Quality and Marketing

By Francis L. Gerdes

In Charge, Stoneville Laboratory, Research & Testing Division, Stoneville, Mississippi

MECHANIZATION of cotton production, involving the use of mechanical equipment for the control of grass and weeds, the mechanical cotton picker, and other mechanical devices, has proved to be economically and technically feasible during the past two years at the Delta Branch Experiment Station and has been applied on several plantations in the Yazoo-Mississippi Delta. Plans for mechanization over wide areas, particularly on the larger farms, are now in advanced stages of development in the Delta. Labor shortage and high costs of labor in recent years have been important factors in bringing about expansion in mechanized farming. Moreover, a realization on the part of Southern agricultural leaders that economies need to be sought in the production, marketing, and manufacturing of cotton in order to maintain a stable and profitable industry is another important factor responsible for the achievements made so far in the mechanization of cotton production.

Research, developmental, and testing work in the fields of agronomy, agricultural engineering, technology, and marketing is providing information basic to complete mechanization of cotton production. At Stoneville, Mississippi, a program has been developed

for coordinating the efforts of workers in these fields. The Delta Experiment Station operates a large experimental farm devoted to all phases of cotton production research—breeding, agronomy, agricultural engineering, and insect control—with emphasis on the development of mechanical methods for the production of cotton.[1] At the Station, the U. S. Department of Agriculture operates the U. S. Cotton Ginning Laboratory, known throughout the Cotton Belt for its research and developmental work in cotton ginning and packaging and related processes. The third unit devoted to cotton research and testing is the U. S. Cotton Fiber and Cottonseed Laboratory, which is charged with the responsibility of testing for quality the samples involved in the production and ginning research work at Stoneville, as well as samples for public and private cotton breeders, shippers, manufacturers, and others interested in improving the quality of cotton and efficiency of marketing.

[1] See "Mechanical Production of Cotton in the Yazoo-Mississippi Delta," by J. E. Adams and P. W. Gull, BETTER CROPS WITH PLANT FOOD, November 1946.

The Stoneville groups and the Agricultural Economics Department of Mississippi State College are working closely together on the cotton production mechanization research and developmental program, which through the support of all branches of the industry is already beginning to pay dividends. Attention is being focused on the development and testing of production practices, varieties, plant-defoliation procedures, mechanical picking practices, and cleaning, drying, and ginning methods that will aid in maintaining the standard of cotton quality. Also, mechanization of cotton production has now reached such a stage of development that problems incident to marketing and manufacturing the mechanically-produced cotton must be dealt with in order to assure complete success in this enterprise. The research studies, completed this year in connection with mechanization, have brought out from the standpoint of lint quality effects the following facts:

(1) The characteristics of the variety of cotton planted on mechanized farms definitely influence the grade of ma-

Fig. 2. Laboratory workers determine strength, length, and other properties of cotton produced in the mechanization studies at Stoneville, Mississippi.

chine-picked cotton. It was evident that in the process of machine picking, the varieties of cotton characterized by smooth leaves gave higher quality lint by one full grade than varieties having an abundance of hairs on the cotton leaf, the differences in grade being reflected in differences in mill waste.

(2) Flame cultivation appeared to give higher grade machine-picked cotton than ordinary plantation methods for controlling grass and weeds. This process eliminated the grass and weeds that are normally gathered with the picker, thus reducing the foreign matter content of machine-picked cotton.

(3) Dusting of cotton plants with calcium cyanamid during the harvesting season to cause leaf shedding again proved to be helpful in facilitating mechanical picking and in reducing the amount of extraneous material in seed cotton. This practice was especially effective where the physiological condition of the plant was favorable and moisture on the plant foliage was sufficient to create the chemical reaction needed for causing the leaves to shed properly from the plant, and where fair weather conditions prevailed long enough for the cotton to be machine-picked before a second growth developed from subsequent rains. It was again verified that the application of the defoliant can be made as early as three weeks after the last bolls are set and still have no adverse effects on the quality of the cotton fiber.

(4) Improvements made in the spindles of the mechanical picker in 1945 made it possible to harvest a high percentage of the cotton with the use of much less water in doffing and resulted in substantial improvements in the grade of the lint and cottonseed over 1944. The difference in grade between hand- and machine-picked cotton in 1945 ranged from one to two grades as compared with the difference of two to three grades in 1944.

(5) In most comparative spinning tests in 1945, the results of tests of previous years with respect to yarn strength were confirmed, in that they showed that machine-picking produced cotton of higher yarn strength than hand-picking, presumably because it passes up immature locks to a greater extent.

(*Turn to page* 39)

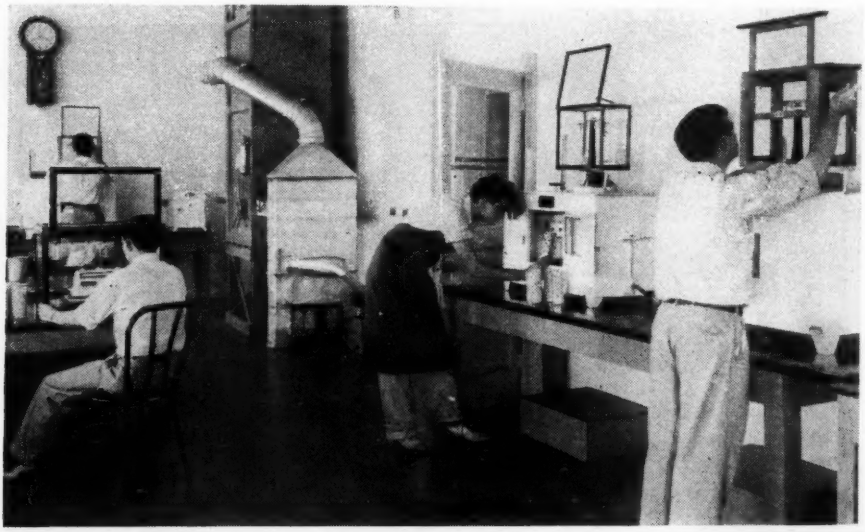


Fig. 3. Testing machine-picked cotton for moisture content to determine how it compares with hand-picked cotton. The picker generally adds 2% moisture to the cotton during the picker spindle doffing operations, and driers are used at gins to remove this excess moisture.

How Guernsey Calves Helped Solve A Feed and Crop Fertilization Problem

By E. R. Kuck

Brookside Farms, New Knoxville, Ohio

THIS STORY has its setting in the combination calf and maternity barn, built in 1945 to better control the hazards involved in the birthing of calves and bringing them through the critical first 60 days of life. Great care was exercised in the planning of this building, particularly with regard for ample space, provision for proper lighting and ventilation, and a type of construction which would lend itself best to thorough sterilization and fumigation. The reason for this enterprise was to substantially eliminate the high mortality rate (23% to 41% annually) among our new-born calves.

Title to Brookside Farms, New Knoxville, Ohio, was acquired in 1933 and a general farming program featuring a pure-bred Guernsey dairy herd, pure-bred Poland China hogs, and a 500-layer flock of White Leghorn chickens was inaugurated. The farm originally consisted of 180 acres in two units. Subsequently three additional farm units were leased, involving an additional 240 acres. Much of this land has been in cultivation for 100 years and the soils are principally Miami silt loam, Crosby clay loam, and some rich Brookston loam.

Having had the advantage of an agricultural college training (Purdue 1920-Ohio State 1922) and having a natural inclination to scientific study, I introduced all the latest ideas and procedures in soil and animal husbandry that came to my attention. Careful records concerning each enterprise have been kept since 1933.

However, the employment of all the latest scientific principles involving poultry, swine, and dairy cows did not permit me to fare any better than most of my neighbors. A high mortality rate with young chickens caused me to drop the poultry program in 1939. A high mortality rate with pigs caused me to abandon the swine-breeding program in 1940. Today the entire farm program at Brookside Farms is devoted to dairying, and in this we have had no small amount of discouraging experiences, especially with a high mortality in young calves, with mammary disturbances in the milk cows—both milk fever and mastitis—and, of course, the ever-present problem of shy breeders.

The foregoing background brings us to the present status of Brookside Farms with a normal milking herd of about 100 head of milk cows, 50 bred heifers, 70 open heifers, and about 40 head of bull calves. All of these animals, excepting the bull calves, are grown to maturity and given an official production test during their first lactation period, after which they are sold on the basis of an automatically applied price formula based on the pounds of butter fat produced.

Under the above program there are

Calves ate the finishing plaster from the walls in an effort to supplement their magnesium-deficient feed.

approximately 120 calves born each year. When 49 of these calves died in one year it was not only a disappointing experience but it also represented a real economic loss. It was because of this heavy mortality rate that the modern calf and maternity barn was planned and built.

This barn 28′ x 72′ was constructed of clay tile building-blocks with all the inside walls plastered with a two-coat plaster application. Ample window lighting and ceiling ventilation were installed. The barn was started in November 1944 and was put in use about April 15, 1945. All the walls in the 16 individual calf stalls were given a rough coat plaster application and six of these stalls were given a finish coat plaster application. The other 10 stalls were not completed with the finish coat until the latter part of October 1945. All of the stalls were promptly put in use, but our experience with the calves remained the same. They kept right on turning up their heels with the same symptoms as before.

Symptoms

The following symptons prevailed: Calves were born weak with slow reflexes and no appetite; dietary scours developed in 100% of the cases, 50% of the cases were accompanied by low type of pneumonia with much coughing; calves that died invariably went down with convulsions and no calf ever to go into the convulsion stage lived beyond six hours.Strong, disagreeable odors always were present in the stalls. Calves that lived through the first 90 days showed remarkable recuperative ability and matured to good size without any signs of these calfhood disorders.

Attempted Treatment

Thousands of dollars were spent to find a practical cure. Every type of treatment involving the entire list of sulfa drugs, vitamin tablets and vitamin preparations of every description, blood transfusions from the mother, calf scours serums and vaccines, modification of the milk formula graded down to pure skim milk, special pre-natal feedings to the mothers—all of these were tried with no change in the general results.

Discovery

As previously explained, six of the calf stalls had been completely finished with the finish plaster coat and the other 10 had only the rough coat application. The observation that, for some reason the calves were severely mutilating the finished walls in each of the

six finished stalls was almost immediately made. No particular thought was given to this at first except as to whether it would pay to have the other stalls finished if the calves would mutilate the walls any way. Then one day the belated thought came to me: Why are those calves trying to eat the finish coat from the wall? Close inspection revealed that the rough-coated walls had not been touched.

A partially filled bag of the material used for the finish plaster coat was at hand and I requested the manufacturer to send me a detailed chemical analysis of the materials used in this finish lime material. Considerable correspondence followed and it was learned that this material was prepared from a heavy dolomite lime analyzing:

Calcium Carbonate $CaCO_3$	53.94%
Magnesium Carbonate $MgCO_3$	45.47%
Other elements	.59%
	100.00%

This company also sent their chemist to our farm where for several days we made exhaustive soil tests from all of our fields and found the following:

Element	No. of samples	Lowest reading	Highest reading	Average for farm
pH	17	5.4	7.2	6.36
Nitrogen (Parts per M)	17	25.0	60.0	35.0
Phosphorus (# per acre)	17	50.0	100.0	70.0
Potassium (# per acre)	17	120.0	220.0	180.0
Magnesium (# per acre)	12	very low	low	very low plus

Deduction

The natural deduction, based on the foregoing information, led me to assume but one answer—the element magnesium. A carload of this material was immediately ordered with 4 tons of the material ground to a fineness to go through a 200-mesh screen for mineral supplement feeding and 40 tons to go through a 100-mesh screen for pasture and field application. The car was unloaded August 25 and our extensive experiments started from this date.

Feeding Practice

Regardless of season, it has been our custom to feed a grain ration supplemented to provide a 16% protein ration. The supplement used was manufactured by a nationally prominent feed manufacturing concern and was guaranteed to contain the mineral elements necessary to heavy milk production. Nevertheless, we always added to this ration an additional 40 lbs. per ton of a mineral mixture made up as follows: 40 lbs. of 98.4% pure calcium carbonate, 40 lbs. steamed bonemeal (or 40 lbs. defluorinated di-calcium phosphate if bonemeal was not available), and 20 lbs. of salt. This formula has not been varied since 1938.

On August 25 I ordered a change in this home-mixed mineral as follows: Substitute dolomite lime (54% $CaCO_3$ · 45% $MgCO_3$) for the pure 98.4% calcium carbonate used previously and add 40 lbs. additional dolomite lime to each ton of feed mixed.

This order was predicated on the assumption that the calcium carbonate content would remain about the same as with the 98.4% pure calcium carbonate used before, but the additional amount of magnesium carbonate would be fairly high.

Results

All of the calves in the calf barn were fed milk from the cows receiving this new mineral mixture. After

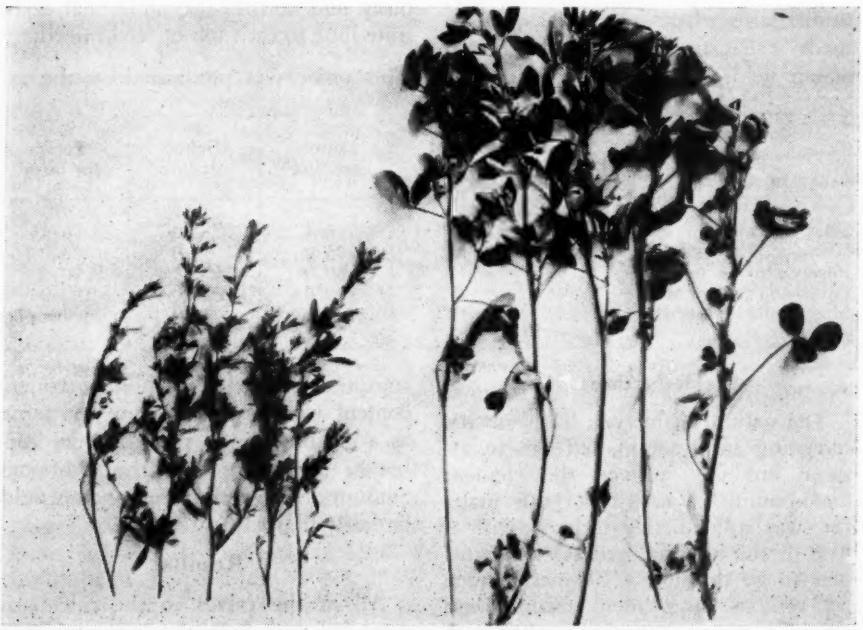
about two weeks it was noticeable that the odor previously present in the stables was becoming less, and we noticed a considerable change in the droppings of the calves. We also noted a gradual increase in the thirst for water on the part of the calves between feedings. The calves became more alert and, as if by magic, the scours condition cleared from the older calves. The calves just born, however, still proceeded through the scours stage but soon recovered when put on milk. During the latter part of October the remaining 10 stalls were treated with the finish lime coat, using the same material as was used for the first six stalls, and not a single tooth-mark is to be seen on any of these walls to this date.

At this point we were satisfied that we had made a very important discovery. Then followed a long list of experiments that are still in progress, some with very illuminating and striking evidence of the importance of the proper balance and the inter-relationship of certain major and trace elements.

Other Observations

1. On August 25, there were 16 cows in the milking herd quarantined for mastitis. On September 15, 13 of these animals were entirely cleared without any other treatment. On October 6, a herd test was made involving 79 animals, only 2 reactors were found and they showed slight traces in one quarter. Today there is not a single animal in quarantine for mastitis on the farm. Previously the incidence of mastitis would affect better than 50% of the herd at one time or another during a lactation.

2. On August 25, we were carrying on our No. 2 farm 23 head of dry cows that had completed good production records but which we had not been able to breed. The pasture on this farm was treated with a 700-lb. application of the dolomite lime on August 27. Excellent fall rains produced a good pasture during the latter part of Septem-



Right: Healthy, vigorous alfalfa, produced on a field treated with dolomite; left: poor growth of alfalfa from an adjacent, untreated field.

ber and these cows ranged this pasture until in December. In addition, they had free access to the mineral in special boxes in the barn. On January 8, 1946, when these animals were bled for our periodical Bangs and TB test, 18 of them were pronounced safely with calf by the veterinarian and 20 have subsequently calved on dates showing they were bred about October 1 or after. The same bull accompanied these cows throughout the year.

3. Milk cows that had been on the dairy mineral feed for at least two months before they were turned dry produced strong, normal calves that did not go through the scours stage. Check cows and heifers that did not have the advantage of the mineral mixture dropped weak calves and gave the same symptoms and results as before.

Mr. Kuck shows the difference in corn yield. Left string, untreated; right string, dolomite treated.

Field Crop Observations

The most striking evidence of the effect of this magnesium element remained to be found in the crops from the dolomite-treated fields. In an abnormally wet spring season, followed by one of the most severe droughts in late summer ever experienced in my immediate community, the results could be read without effort. The outstanding observations were briefly, as follows:

1. Because of an abnormal rate of rainfall following corn-planting season, the corn fields generally presented a mottled array of colors—a patchwork ranging from yellow to dark green. This phenomenon was attributed to drowning and excessive rainfall. However, these yellow areas were evident on high ground as well as in depressions. On the dolomite-treated fields, the corn retained a uniformly green color and the yellow spots were not evident except in a few isolated places where plants were in water for three or four days. However, it was noticed that these plants had a remarkable recuperative ability.

2. Where nearly all of the untreated corn fields in the immediate community were severely fired, the dolomite-treated 120 acres of corn on this farm remained green throughout and made a highly increased yield over the average of the community.

3. Following the third cutting of alfalfa hay the stand, generally, turned yellow and brown, giving the appearance of being dried up. The dolomite-treated fields are going into the winter with a healthy, dark-green color.

Indiscriminate use of magnesium salt may result in detrimental effects

(*Turn to page* 39)

Alfalfa—A Crop to Utilize the South's Resources

By J. A. Naftel

President, Plainsman Farms, Auburn, Alabama

A LONG growing season and ample rainfall have been referred to as great assets to the South, but in the past farmers have never completely utilized these possible natural resources in producing crops. On the other hand, long periods of high temperature and heavy rainfall have through oxidation of organic matter, erosion, and leaching actually depleted our lands of their native fertility. This, if allowed to continue, will remove more and more land from economical production.

Row crops such as corn and cotton occupy a majority of the cropped acreage. These crops are clean-cultivated and have a growing period of about five months, or a productive period of only 40 to 50 per cent of the annual period. During the other half of the year, high losses of soil and natural resources occur. An ideal crop would be a perennial that could be quickly established, would grow throughout the year, conserve the soil, require little cultivation and hand labor, fit into a desirable rotation, and yield economical returns of a useful product.

Alfalfa meets most of these requirements in that it is a perennial readily established, with returns the first year. It grows about 10 months out of the year and not only conserves the soil but through nitrogen fixation and deep root penetration increases the fertility of the surface soil. Moreover, alfalfa requires practically no cultivation or hand labor and, finally, it produces relatively higher returns than most other crops.

The question as to why alfalfa has not been grown in the Southeast to any great extent in the past naturally arises. The answer now appears simple. It was discovered only recently that two essential plant foods were deficient in the soils and fertilizers when earlier attempts were made to grow alfalfa on many of our soils. The two elements were potash and boron. Earlier trials had generally supplied ample phosphorus and lime but insufficient potash and no boron. Since the recent discovery that alfalfa could be grown successfully on soils that were formerly considered unsatisfactory for the crop, the growth of alfalfa has been confirmed throughout the State on types representing most all of the well-drained soils (table 1).

Borax and Potash Needed

A brief historical background of the recent discovery of the treatment required for successful alfalfa is of interest and demonstrates the value of agricultural research. Formerly, large acreages of alfalfa were grown in the Black Belt on the calcareous soils, but stands could not be maintained and Johnson grass usually took over these fields. Consequently, interest in alfalfa in this area was largely lost. The fertile red lands of the Tennessee Valley have been planted to limited acreages of alfalfa for many years, but stands deteriorate and the acreage of this crop has not been extensive. Small acreages of alfalfa have been successfully grown in the Piedmont for several years, but the crop has not been commercially established. Alfalfa on Sand Mountain was not successful until a few years ago when adequate amounts of potash and borax were supplied in addition to the

usual lime and phosphate treatments.

Perhaps the greatest impetus and stimulation of interest in alfalfa stemmed from the results obtained with potash and borax in 1942 from a small 8 x 16-ft. plot in the Crops Garden at Auburn. This is located on a Norfolk sandy soil. Since this investigation is considered the origin of the revival of interest in alfalfa in the State, it will be discussed in detail.

In the Crops Course of the Alabama Polytechnic Institute, an introductory crops garden is maintained in part for the benefit of student classes. Many students, especially those of middle and south Alabama, had never seen alfalfa except in baled hay which generally was shipped into the State from the Midwest. Consequently, a small plot was seeded in the fall of 1941 to alfalfa with the usual lime, phosphate, and potash treatments. An excellent stand of alfalfa was obtained but the crop lost its vigor, turned yellow, and appeared doomed as most alfalfa trials had been in the past on similar soils outside of the "Alfalfa Belt."

This plot, however, was divided into four sub-plots and borax and additional potash treatments were applied to certain of these sub-plots following the first cutting. Satisfactory growth resulted (table 2). The alfalfa on the sub-plot without additional potash and borax did not survive on this soil. Thus

TABLE 1.—YIELDS OF ALFALFA IN THE OLDER ALFALFA SECTION AND IN ALABAMA

Yields in tons per acre of hay

State	Old Alfalfa Section[1]	Alabama results[2]	
	With fertilizer	Location	Yield
New York	1.8	Tennessee Valley	2.4
New Jersey	2.8	Sand Mountain	3.4
West Virginia	3.3	Alexandria	3.8
Tennessee	2.5	Lafayette	4.2
AVERAGE	2.6	Auburn	4.0
		Black Belt	2.3
Ohio	3.6	Atmore	5.0
Michigan	2.4		
Indiana	2.6	State Average	3.58
Illinois	3.5		
Wisconsin	2.7	North Alabama Average	3.20
Iowa	3.0		
AVERAGE	2.96	Central and South Alabama, exclusive of Black Belt AVERAGE	4.40
Missouri	3.9		
Kansas	2.0		
Oklahoma	4.6		
AVERAGE	3.5		
Montana	3.0		
Idaho	4.6		
Utah	4.0		
Oregon	4.6		
AVERAGE	4.0		
California	6.6		
New Mexico	6.7		
AVERAGE	6.65		

[1] From The Fertilizer Review XXI (1946).
[2] From "This Month in Rural Alabama." June 1946, Ala. Extension Service.

TABLE 2.—THE YIELD OF ALFALFA ON NORFOLK SAND WITH DIFFERENT POTASH AND BORAX TREATMENTS [1]

Fertilizer treatment—pounds per acre		Yield of hay per acre in pounds			
Fall of 1941	After first cutting—1942	Cutting—1942			
		1	2	3	Total
200# muriate of potash, 1,000# superphosphate, 3,000# dolomite	None	1,564	1,430	367	3,361
Same as above	340# muriate 30# borax	1,564	2,497	1,414	5,474

[1] Sturkie, Rogers, and Naftel: Unpublished data Alabama Agricultural Experiment Station.

was seen the possibility of growing alfalfa on the light sandy soils of the Southeast through the use of borax and adequate potash in addition to the usual lime and phosphate applications. The significant finding in this exploratory test was that borax and more potash than was formerly believed necessary made the difference between success or failure with alfalfa.

Discussion

Alfalfa yields in southern Alabama are higher than in the northern part of the State. This is in contrast to yields of most other crops. Moreover, alfalfa yields are higher in central and southern Alabama than in the corn belt or midwestern states of the alfalfa region (table 1). The probable reasons for the higher yields in the Southeast are a longer growing period, the use of larger amounts of fertilizer, and high temperature and high rainfall. All of these produce more cuttings annually than in some other sections.

Present general recommendations for establishing alfalfa are two tons agricultural limestone, 500 pounds superphosphate (20%), 300 pounds muriate of potash (60%), 20 pounds borax, and 25 pounds seed per acre, representing an outlay at present of approximately $35 to $40 per acre for the first year. Annual fertilizer maintenance cost of 400 pounds of superphosphate, 300 pounds of muriate of potash, and 15 pounds of borax approximates $12 per acre. Over a five-year period, the annual cost per acre would be approximately $17.60 for seed and fertilizer. With an average annual yield of three tons of alfalfa hay per acre at $40 per ton, the gross income would be $120 per acre. For a five-year period, the fertilizer and seed cost would amount to approximately $88 and gross income approximately $600 per acre. The difference between these two amounts represents other costs and profit and it appears promising that there would be a good chance for profit. By grazing alfalfa with hogs or other livestock, even greater returns might be possible. The above does not consider the erosion control and the gain in nitrogen and organic matter content of soils which preliminary results show to be highly valuable where corn followed the alfalfa.

Alfalfa is a deep-rooted plant that penetrates the subsoil to several feet and quite commonly to five-ft. depths or greater in some soils. This means that alfalfa feeds on perhaps 10 times the volume of soil that is used by many ordinary row crops. When it is considered that a stand of alfalfa gives complete coverage on the surface of the soil, it is readily understood that row

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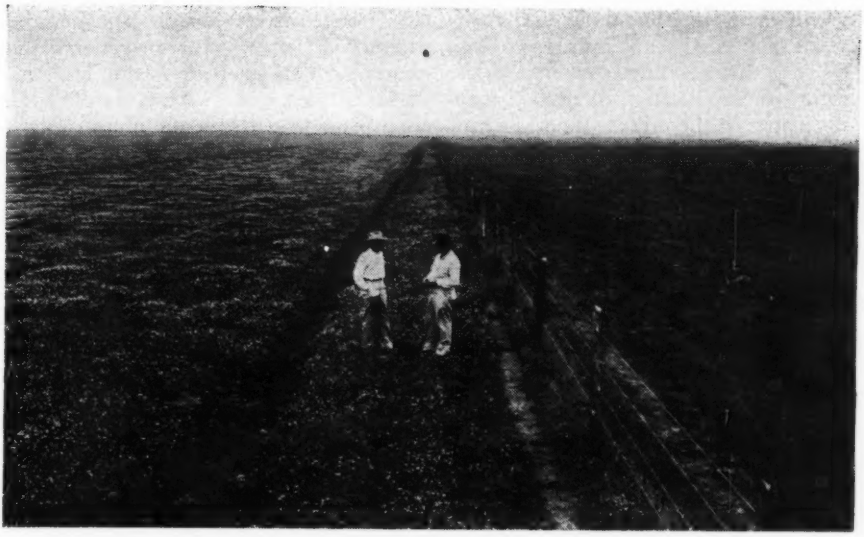

Agricultural Experiment Station in the Brazoria-Galveston, Texas, Soil Conservation District on the Coast Prairie. Area shown has been plowed, disked, leveled, drained, seeded to white clover, lespedeza, Bermuda and dallis grass, and mowed. The pasture where the men are standing had 100 lbs. of available phosphoric acid mixed with the soil; the pasture across the fence had none. Maximum recommendations for this area for pasture development are: 120 lbs. P_2O_5; 70 lbs. K_2O; 16 lbs. N; and 3 tons of limestone.

A Discussion of Soil Analyses on the Forested Coastal Plain, Bottomland Coast Prairie, and Cross Timbers of Texas

By M. F. Wichman

Soil Conservation Service, Temple, Texas

THE Soil Conservation Service Operations Laboratory at Temple, Texas, has made more than 500 soil analyses for soil conservation district cooperators during the past year. These farmers, seeking to establish coordinated soil conservation measures on their farms, have realized that plant succession, longer grazing seasons, quantity and quality of forage, and freedom from certain diseases in animals are due largely to the balanced fertility and fertility management of their pasture and meadow soils.

That statement can be made about cultivated soil and its fertility relationship to the human.

In a good soil management or fertility management system, various and important factors must be considered; some of these are: Cultural practices and tilth, noxious plant control, plant disease and insect control, vegetative and mechanical erosion measures, crop

rotation and proper land use, and application of needed plant nutrients. Here we are primarily interested in the last factor—the application of needed plant nutrients. At the present time 14 nutrients are thought to be necessary for normal plant development; of these, we are interested in those most important—phosphate, potash, nitrogen, and lime.

Soil fertility might be defined as the ability of a soil to produce adequately those crops which are permitted by climate. The most frequent cause of infertility is the deficiency or excess of moisture. Fertility depends upon a balance of all factors. Where fertility is out of balance the limiting factor must be found and corrected. Fertility can be determined only in terms of specific crops. When applying fertilizers to soils we are adding them to balance the elements present, feed the micro-organisms, and supply available plant nutrients.

On the various samples, recommendations have been made for either soil-conserving crops, soil-improving crops, pastures (grass and legume), or for meadow development.

These analyses reveal some definite trends in Texas soils. In general, the base content, or base saturation,* increases from east to west (as does the soil reaction); that is, the more western soils have more base materials such as calcium, sodium, potassium, and magnesium available and are less acid. Forested Coastal Plain soils in east Texas are different in reaction (pH) from other Coastal Plain soils in that they are generally more acid in the subsoil than they are in the surface soil. Occasionally Cross Timber soils will have a high base saturation but will be low in available calcium. The potash content of soils increases from east to west.

Deep, medium-textured, slowly permeable soils in east Texas have an average of 50 p.p.m.** or less of available potassium, while soils of the same na-

* Base saturation of a soil is the proportion of base elements—calcium, magnesium, sodium, and potassium—that tend to saturate the small organic and inorganic soil particles or those colloidal in size. Under favorable conditions the hydrogen ion (acid) will displace the bases, causing the base saturation to vary.

** All references to available plant nutrients in parts per million are determined by using LaMotte procedures. Some of the plant-food nutrient levels are still questionable and will vary greatly with increased exchange capacity and other factors.

Adding 5-10-5 fertilizer at 100 lbs. per acre helped the corn at the left make its good growth. The corn at the right of Collin Johnson, cooperator with the Kiamichi Soil Conservation District near Hugo, Oklahoma, has not been fertilized. This farm is on the Forested Coastal Plain. Johnson says that his fertilized cotton produced 100% more than his unfertilized cotton.

The Cross Timber soils of Texas often show a need for phosphate to get maximum production, controlled erosion, and sustained fertility. Here brabham peas, on the left, have been fertilized with 100 lbs. of 20% superphosphate. The other peas on this fine sand have not been phosphated. Both areas have been in a crop rotation, but the value of the phosphate is evident. J. B. Inabnet, cooperator with the Brown-Mills Soil Conservation District and owner of the site shown, calls this area part of his best land. In this area there is often need for complete fertilizers on most crops though in smaller amounts than in east Texas.

ture and basic land resource area in the vicinity of Yoakum will have 70 to 80 p.p.m. of available potassium. On these soils, in the vicinity of Yoakum, it is indicated that small applications of potash will pay. As a whole the soils of all four of the basic land resource areas, Forested Coastal Plain, Coast Prairie, Bottomland, and Cross Timber, are low in available phosphorus. Low plant-food nutrient levels or lack of plant-food nutrient balance are two of the chief reasons for low productivity. For the eastern part of Texas (east of the Blacklands) phosphorus is the nutrient most commonly needed, then potassium, and finally calcium or lime. All of these soils are deficient in nitrogen; it can be used to advantage.

Forested Coastal Plain soils having 30 to 40 p.p.m. of available phosphorus do not respond to applications of phosphate. Phosphorus is essential for plant growth since it hastens maturity, encourages symbiotic bacteria, increases root development, aids in starch digestion, stimulates drought resistance, helps seed formation, and is necessary for cell division and formation of fats and albumen. A lack of phosphorus, indicated by a purpling of the leaves, results in a restricted root system.

Forested Coastal Plain soils having 80 to 90 p.p.m. of available potassium have an adequate supply of this nutrient and applications of potash are not profitable. The influences of potash upon plant growth are many; it gives tone and vigor to plants, increases resistance to certain diseases, encourages an adequate root system, acts to balance nitrogen and phosphorus, and is essential for starch formation, translocation of sugar, and development of the green coloring matter. Potassium or potash helps grain formation and is necessary for legumes. In general, root crops will respond to its application. Sodium and potassium are similar in plant nutrition but sodium can not completely take the place of potassium. Plants that have dry and scorched leaf edges, with the surface somewhat spotted, reveal potassium deficiencies.

Five hundred to 750 p.p.m. of available calcium are adequate for good plant nutrition if the soil is from 70 to 80 per cent saturated with bases. This will hold true for Forested Coastal Plain soils with low exchange capacities. As the exchange capacity * increases, the available calcium should increase. For different plants the available calcium required will vary. Blackberries and watermelons need very little, most legumes do best with small amounts, clovers like more than vetch, while alfalfa and okra do best where there is plenty of available calcium. When calcium is applied to the soil, generally in the form of limestone, care must be taken not to overlime as this practice is harmful. Calcium is an essential material for plant growth, since it effects translocation of plant foods, acts as an agent to speed up or retard chemical reactions, and helps regulate internal plant reactions. The formation of chlorophyll is poor when calcium is low. Calcium also seems to make membranes more permeable. Plants that are deficient in it have poor color. Lime is applied as a nutrient and to change base saturation; it is not applied primarily to correct soil reaction.

All soils in the eastern part of Texas are deficient in nitrogen. The nitrogen content of soils will vary day to day and from season to season and it is for this reason that tests for available nitrogen are not made by the laboratory. Nitrogen can be used to advantage on grass pasture, cultivated land that is to be retired and put in pasture, kudzu, oats, and other small grains. Nitrogen is an essential material of protein and protoplasm, since it is used primarily to produce vegetative growth. It is also necessary for reproduction and stalk development. Plants lacking nitrogen are stunted and have a yellow appearance.

The level of available plant-food nutrients within the various basic land resource areas will vary with the amount of organic matter present and the exchange capacity. Soils with low exchange capacities can use less fertilizing materials than those with high exchange capacities.

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* Exchange capacity—The ability of a soil, due to the small organic or inorganic particles (colloids), to hold fertilizing materials whereby the plants may take them up.

Spreading lime near Mt. Pleasant, Texas, in the Sulphur-Cypress Soil Conservation District. Lime is a definite asset in pasture improvement work at this location on the Forested Coastal Plain. The farm is owned by John B. Stephens, a district cooperator.

Fertilizing & Cropping Systems for Flue-cured Tobacco

By F. A. Stinson

Officer-in-Charge, Delhi Experiment Station, Delhi, Ontario

FLUE-CURED tobacco farmers in Ontario point with pride to crops on their new land and take for granted lower returns from those on fields that may have grown only two or three crops of tobacco alternated with rye. Indeed, there is striking evidence that already, productivity has fallen off seriously on many areas where tobacco has not been grown for longer than 15 years. Along with soil depletion owing to crop removal, soil erosion, and leaching, a gradual but somewhat alarming increase in tobacco root rot has taken place. Results of experimental work indicate that such conditions may be avoided by practical and economical means and that general improvement in cropping practices is needed to insure economic use of this land for growing tobacco in the future.

When tobacco was first planted on these soils, they usually contained a reserve of organic matter, stored up over a number of years in grass or other soil-building crops. Decomposition of organic matter went on at a rapid pace under the influence of cultivation required in growing tobacco. In the meantime, while the reserve of organic matter lasted, alternating tobacco with rye was apparently an ideal system, and it accordingly became the established practice. As organic matter dwindled, tobacco crops responded remarkably to barnyard manure which could be bought at low cost on general farms in surrounding districts. Although the selling and hauling of manure rapidly became a business of considerable proportions, subsequent developments have shown that there are definite limits to the extent that barnyard manure can be used in solving the problem of declining soil productivity. Not only are available supplies inadequate for the ever-increasing acreage, but its frequent use for tobacco in such an intensive cropping system makes conditions more favorable to the incidence of black root rot. Accompanying the increased use of barnyard manure for this crop, black root rot has become the most costly disease with which tobacco farmers have to contend. To avoid possibility of serious loss from this disease requires planting flue-cured tobacco not oftener than once in three years, under present conditions.

Rotation studies at Delhi indicate that the length of rotation has a decided influence on the returns per acre of tobacco. This is illustrated by records of yields and gross returns per acre that are tabulated in table 1. The

TABLE 1.—AVERAGE YIELD AND GROSS RETURNS PER ACRE WITH FLUE-CURED TOBACCO IN TWO- AND FOUR-YEAR ROTATIONS. (1944-1945)

Length of Rotation	Yield per Acre Lbs.	Returns per Acre $
Two-year	1,262	295
Four-year	1,483	357

returns per acre from tobacco in the four-year rotation were more than 20 per cent higher than from those in the usual two-year rotation. Although results over a sufficient number of years

TABLE 2.—AVERAGE GRADE VALUE, YIELD PER ACRE AND GROSS RETURNS PER ACRE WITH FLUE-CURED TOBACCO GROWN IN TWO-YEAR ROTATIONS DURING SIX YEARS.

Rotation Flue-cured Tobacco Following:	Grade Index ¢	Yield per Acre Lbs.	Returns per Acre $
Rye disked when mature	25.3	1,339	338
Rye harvested	25.2	1,244	313
Oats	25.7	1,183	304
Weed fallow	25.2	1,157	292
Soybeans harvested at maturity	24.0	1,028	246
Bare fallow and five tons per acre barnyard manure	23.8	1,192	283
Buckwheat	23.6	1,175	278
Field corn	23.3	991	231
Soybeans ploughed under green	22.0	1,406x	209
Sweet clover	19.1	1,148xx	229

x—100 pounds green leaf of no commercial value.
xx—183 pounds green leaf of no commercial value.

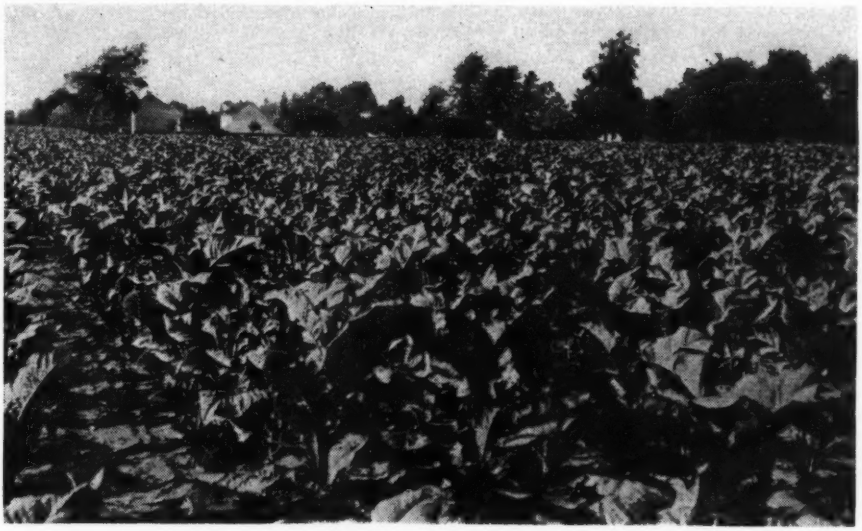
to warrant definite conclusions are not available, those presented serve to indicate that the increased returns from the tobacco in the longer rotation are likely to be more than sufficient to cover the investment in extra land. Besides the larger average cash return from tobacco grown in rotations capable of maintaining soil productivity at a high level, it has been noted that there is less variation between the crops in good and poor tobacco seasons. This fact should prove of interest not only to farmers but to all of those concerned with stability of tobacco production. In a good three- or four-year rotation there is also an opportunity to secure revenue from one or more crops in addition to tobacco.

There are a number of crops that may be used to advantage in the flue-cured tobacco rotation, provided they are properly arranged and grown. An indication as to the relative effect of several different crops when grown immediately preceding flue-cured tobacco can be gathered from table 2 which contains data on tobacco in two-year rotations with various cropping systems. In each instance a winter cover crop

TABLE 3.—AVERAGE GRADE INDEX, YIELD PER ACRE AND RETURNS PER ACRE WITH FLUE-CURED TOBACCO IN TWO-YEAR ROTATIONS DURING SUCCEEDING FIVE-YEAR PERIODS, 1935-1939 AND 1940-1944, RESPECTIVELY.

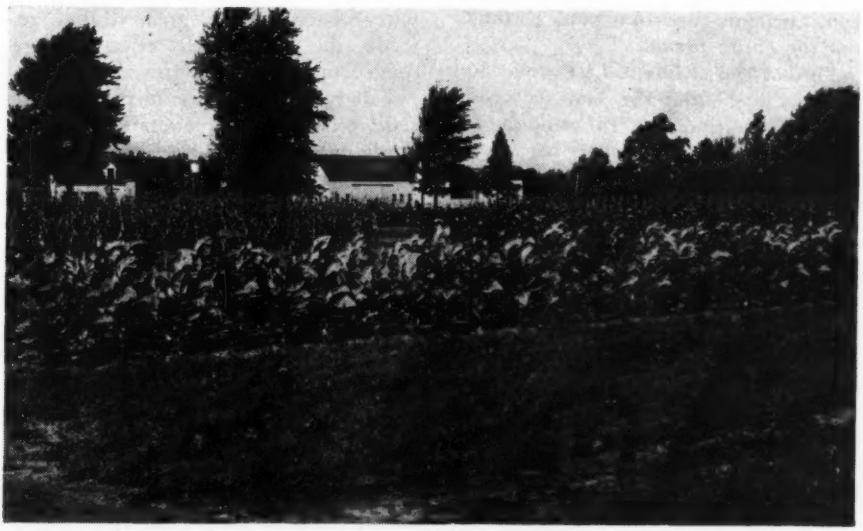
Rotation	Average for Five Years (1935–1939)			Average for Five Years (1940–1944)		
Flue-cured Tobacco Following:	Grade Index ¢	Yield per Acre lbs.	Returns per Acre $	Grade Index ¢	Yield per Acre lbs.	Returns per Acre $
Rye disked when mature	28.0	1,415	396	26.2	1,256	329
Rye harvested	27.4	1,384	379	25.9	1,174	304
Soybeans harvested at maturity	27.5	1,336	368	24.4	951	232
Soybeans ploughed under, green	24.7	1,407x	247	22.8	1,403	319
Field corn	27.6	1,288	355	24.2	926	224

x—100 pounds green leaf of no commercial value.



A field of flue-cured tobacco. Experimental plots at Delhi.

of rye followed the tobacco but the tobacco crop was preceded only by the incorporation of whatever crop residue remained. Tobacco planted the year after a seed crop of soybeans or corn was light in yield and suffered from a crop effect known as "brown root rot." A heavy growth of tobacco that failed to mature properly and was of low grade followed soybeans ploughed under when green, as well as sweet clover, indicating that these crops stored up too much available nitrogen for tobacco. It may be observed that average returns from the tobacco that followed rye disked into the soil at maturity were considerably higher than those following any other



Early in May next year winter rye cover crop in the foreground will be turned under for tobacco in soil-building studies at Delhi.

TABLE 4.—AVERAGE YIELD AND GROSS RETURNS PER ACRE WITH FLUE-CURED TOBACCO FOLLOWING DIFFERENT METHODS OF UTILIZING THE REST CROP OF RYE. (1940-1945)

Table Following	Yield per Acre Lbs.	Returns per Acre $
Rye disked when mature and ploughed the following spring	1,247	323
Rye disked when mature and fall ploughed	1,225	306
Rye ploughed before maturity and winter cover crop of rye seeded	1,188	299

treatment. Whereas, harvesting the rye gave poorer results than disking the entire crop, numerous observations indicate that combining and reseeding is a highly satisfactory practice.

An idea as to the relative value of different practices for maintaining soil productivity may be derived from data presented in table 3. This table contains a comparison of the tobacco grown in different two-year rotations during the first and second half of a 10-year period. The rotations were continued on the same plots throughout the entire period.

Part of the reductions in grade and yield of leaf from the first to second five-year period were undoubtedly owing to variations in weather conditions, but it is clear that such reductions were greater in some rotations than in others. Disking of rye at maturity offered the most promise of any practice compared, as a means of maintaining production of flue-cured tobacco in the two-year rotation.

TABLE 5.—AVERAGE YIELD AND GROSS RETURNS PER ACRE FOR FLUE-CURED TOBACCO WITH AND WITHOUT WINTER COVER CROPS OF RYE. (1935-1941)

Treatment	Yield per Acre Lbs.	Returns per Acre $
Winter cover crops of rye	1,191	306
No winter cover crops	1,043	266

The growing of crops that are capable of returning a large amount of suitable organic material is essential in rebuilding the productivity of these soils. Maintenance alone is not enough as productive capacity is reduced by the growing of each tobacco crop and this must be rebuilt to prevent reduction in crop growth. Losses in humus, or organic matter of the soil, take place during the growing of any hoed crop such as tobacco, corn, or potatoes. Net losses are reduced, of course, by turning under stubble and by disking or ploughing under plant refuse such as rye straw and corn stalks.

As flue-cured tobacco is sensitive to the effect of a preceding crop, the arrangement of crops in the rotation is extremely important. Late maturity and low quality leaf usually result where flue-cured tobacco follows alfalfa or the ploughing under of other legumes. Tobacco planted the year after corn, soybeans, or timothy sod is frequently light in yield owing to brown root rot. A crop of rye before planting with tobacco does a great deal to remove the undesirable effects where these crops have been grown.

Fall rye is a very useful crop to precede tobacco in the rotation, particularly when the mature rye straw is disked into the soil. Besides having ability to grow during late fall and early spring and to furnish a sole covering during winter, rye produces a large amount of suitable plant material to form humus. Different methods of handling rye were compared in the two-year rotation at Delhi, and data on average yield and returns from six tobacco crops following each method are given in table 4.

Throughout this six-year period fall ploughing was followed each year by a poorer tobacco crop than that where

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When Hugh Bennett went home last September to receive all the honors his home town people could give him, the Soil Conservation Service chief found the streets flag-lined and this huge "Welcome Hugh" sign above the courthouse steps.

Hugh Bennett's Homecoming

By Gordon Webb

Head, Regional Division of Information, Soil Conservation Service, Spartanburg, South Carolina

YEARS AGO when he was virtually a lone crusader against soil erosion Hugh Bennett said, in effect, that you can't go home again.

"There is really no such thing," he declared in talking about his native Piedmont North Carolina, "as returning to the places and people you remember from your youth. Even in my time, my part of the country has changed. The old swimming holes I remember have fallen away to little shallow, red mud puddles. Many a field I remember in virgin woods or thick grass has been cottoned out and gutted."

Hugh Bennett, Chief of the U. S. Soil Conservation Service, did go home in September to Wadesboro, North Carolina, for honors few men are privileged to receive from their friends and neighbors. It was Hugh Bennett Soil Conservation Day not only in Wadesboro but, by proclamation of Governor R. Gregg Cherry, in the whole Tar Heel State.

And the landscape Dr. Bennett saw in September was neither the one he remembered from his youth on a Gould's Fork plantation nor the one he described when he said you can't go home again. Many of the gullies had been healed by rank-growing, forage-producing kudzu. Green blankets of annual lespedeza or the perennial sericea lespedeza had been spread over the red, galled spots. Modern swimming holes—farm fish ponds—had replaced the creek pools for boating, fishing, and swimming.

These were the landscape changes being wrought by the Brown-Creek Soil Conservation District, the first of more than 1,650 such farmer-organized districts in the nation and the sponsor of Hugh Bennett Soil Conservation Day.

Joe M. Liles, farmer, merchant, and chairman of the farmer supervisors of the Brown Creek District, is credited with the celebration idea. Reared on a plantation adjoining the Bennett farm and a boyhood friend and schoolmate of the soil conservationist, Liles had three goals in mind. He wanted to honor the man who has become the world's No. 1 authority on erosion control, to have special events that would remind Bennett of his boyhood days, and to underscore the need for and benefits of soil conservation farming.

"Welcome Hugh"

On the Anson County courthouse steps, beneath a huge, red-lettered "Welcome Hugh" sign, Dr. Bennett received from Mayor G. E. Andes the key to the city. H. P. Taylor, who guided the soil conservation district act through the North Carolina legislature in 1937 and who was master of ceremonies for the day's events, read resolutions passed by the County Commissioners, the City Commissioners, and the Anson County Bar Association in praise of Dr. Bennett's work.

Next was the Rotary-Civitan luncheon where Jonathan Daniels of Raleigh, Tar Heel journalist, author, and former presidential secretary, recalled a visit he'd had with Dr. Bennett early in the war. The chief soil conservationist was just back from a 35,000-mile trip by Army bomber to help South Africa in its fight against erosion.

"I was interested," said Daniels, "in Hugh Bennett's report then not merely as one of his neighbors and chief admirers but because my boss then, Franklin D. Roosevelt, even in the midst of war was already thinking about Hugh Bennett's teachings as a part of a plan for peace for the world which he believed must contain plenty if it could ever hope for security. You remember that the acceptance of Hugh Bennett's discoveries (which for 20 years had been scoffed at) was one of the items in Roosevelt's program for America. The extension of that work was a part of Roosevelt's purposes for the world."

Of Dr. Bennett's work and discoveries, Daniels said:

"Any people who think that Hugh Bennett's science is a mere matter of water and wind, soil and plows have only the slightest understanding of the meaning of Hugh Bennett the man. What he discovered was the carelessness and blindness of man. Men had seen gullies before him. Children can see them. . . . What Hugh Bennett taught us was that in our ignorance and blindness and almost in secrecy, the treasure of our land and our lives can slip from beneath us and suddenly be gone forever. In the science of soils, you know, you call that sheet erosion.

"Perhaps the destructiveness as Hugh Bennett showed it to us . . . may seem now very tame stuff beside the powers to destroy we have deliberately and scientifically developed in our times. I am not sure. But I am sure that not even the atomic bomb is more terrifying than Hugh Bennett's discovery that under our ignorance and complacency the substance of our land could disappear without our awareness."

There were other honors for Dr. Bennett.

With help from 15 banks in the Brown Creek District, the supervisors published and dedicated to Dr. Bennett a 24-page bulletin dealing with their local soil conservation work. Each person attending the celebration received a copy.

Proudly the supervisors said in the dedication note: "Hugh Bennett is known wherever hoe scratches earth. His fame as a land doctor extends to all the continents and to many of the islands of the sea. . . . We are proud that Hugh Bennett is one of us."

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Memories of boyhood days on an Anson County plantation were revived by many special events, including a welcome from "Uncle" Sim Bennett, 80-year-old former field hand on the Bennett farm. Here the chief soil conservationist replies to "Uncle Sim's" words.

Above: **Part of a new land pattern designed by Hugh Bennett.**

Below: **Farm fish ponds replace the silted-up creek swimming holes.**

Above: **New orchards covering many acres are going in on the contour.**

Below: **Erosion-choked stream bottoms have been cleared and put to grass.**

Above: **Fields gutted from one-cash-crop farming are back in production under a cover of kudzu grazed by cattle.**

Below: **Young pine and sericea heal the galled spots, breathe life back into the land. A scene on Bennett's farm.**

The Editors Talk

Agriculture 1946

Another year is drawing to a close and American farmers can look back over it with a keen sense of satisfaction. Again they have hung up another crop-production record—three per cent more than in 1942, their previous all-time record.

According to details given by the Bureau of Agricultural Economics, U. S. Department of Agriculture, the largest wheat crop in history has been harvested. From statistics available, the largest corn crop on record is assured. The same holds for tobacco, pears, peaches, plums, and truck crops as a group. Near-record crops were made by oats, rice, potatoes, peanuts, grapes, cherries, and sugarcane; average or better crops include hay, soybeans, dry peas, prunes, apricots, and sugar beets. Only cotton, rye, sorghum for grain, flaxseed, buckwheat, dry beans, sweet potatoes, and pecans were below average.

In general summary, the aggregate production of food and feed grains is the largest in history, tobacco the largest, fruits and vegetables as a group a near-record, oil crops above average, with only cotton well below average.

One of the amazing things about all of this is that American farmers are today producing a third more products for market than they did before the war. And they have been doing it with 10 per cent fewer workers and very little increase in the land used. One can better realize this achievement when remembering that although there were larger increases in industrial production, manufacturing plant capacity is now much larger than before the war and the number of workers in industry is about a fifth more.

Sherman E. Johnson, Ass't. Chief of the Bureau, says that it is true farmers have been generally blessed with favorable weather during the past half-dozen years, but that only a fraction of the increased production can be attributed to the favorable weather. Witness for example, he says, that farmers set a new production record in 1942 when the growing season was one of the best in history; but in 1945 when the weather was not nearly so good they excelled the 1942 record. Most of the increase is credited to the quick adoption by farmers of new and better ways of doing the job, combined with long hours of hard work.

Probably the most important force bringing about this revolution in agriculture is the tremendous advance in the mechanization of so many farms. Today, at least a third of the farmers have tractors compared with only 14 per cent in 1930. Widespread adoption of the general-purpose tractor, adapted for use on smaller farms and a variety of farm jobs, together with the greatly increased use of rubber tires on tractors and other machines, have stimulated the mechanization of many farm operations.

"Along with increased mechanization in bringing on the revolution in agriculture is the greatly increased use of fertilizer and lime," Mr. Johnson says. "Farmers are now using about twice the amount of fertilizer and three times the amount of lime they used a decade ago. And it certainly is not out of the

question that the quantities used now might be doubled in the next 10 years. Greater use of fertilizer and lime, together with the cumulative benefits of better soil management of the past dozen years, has contributed much in the procession of one yield after another of practically all major crops during the war."

Third place in importance is accorded the unprecedented adoption by farmers generally of improved crop varieties. Hybrid corn is probably the most outstanding example. In the past decade the acreage planted with hybrid seed has jumped from a negligible five per cent of the total corn acreage to over two-thirds of it. Because yields from hybrid corn are about one-fifth more than from open-pollinated, 3-billion bushel corn crops now seem to be the rule rather than the exception. Farmers also have been making more use of higher-yielding, more disease- and weather-resisting varieties of oats, wheat, potatoes, tobacco, cotton, legume hays, soybeans, peanuts, flaxseed, many fruits and truck crops, to name some of the more important.

These far-reaching changes would have been less effective if the extensive soil conservation and improvement practices of the thirties had not helped the soil to stand up under the heavy strain during the war. The technological advances in mechanization, use of fertilizer and lime, improved crop varieties, and soil conservation did not come full blown, almost overnight as it were, at the outbreak of the war. However, it was the war and the incessant demand for farm products at good prices that speeded up the process, that increased the production per acre by a fifth in the past decade and the output per worker a third more.

Today the productivity of American farms is the greatest it has ever been. It is likely to increase, Mr. Johnson believes, as long as farmers are reasonably prosperous and continue the technological advance, even though it may be at a slower pace than during the war.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1920.....	15.9	17.3	125.3	141.7	61.8	182.6	16.46	25.65	....
1921.....	17.0	19.5	113.3	113.1	52.3	103.0	11.63	29.14	....
1922.....	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	40.8	149.0	192.0	109.0	141.0	16.40	52.70	....
1945									
November....	22.52	46.7	131.0	186.0	111.0	153.0	14.90	51.30	....
December....	22.84	43.8	137.0	194.0	109.0	154.0	15.40	51.40	....
1946									
January.....	22.36	36.3	145.0	208.0	110.0	154.0	15.70	50.90	....
February.....	23.01	33.9	146.0	223.0	111.0	155.0	15.80	50.30	....
March.....	22.70	31.9	157.0	236.0	114.0	158.0	16.30	47.50	....
April.....	23.59	42.9	162.0	245.0	116.0	158.0	15.00	48.00	....
May.....	24.09	43.0	157.0	251.0	135.0	170.0	14.80	49.60	....
June.....	25.98	59.0	147.0	251.0	142.0	174.0	14.70	51.50	....
July.....	30.83	56.7	148.0	275.0	196.0	187.0	15.00	60.00	....
August.....	33.55	48.6	143.0	280.0	180.0	178.0	15.10	59.10	....
September...	35.30	48.8	128.0	224.0	173.0	179.0	15.40	57.80	....
October.....	37.69	53.0	122.0	209.0	171.0	188.0	16.10	66.00	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1920.....	128	173	180	161	96	207	139	114	....
1921.....	137	195	163	129	81	117	98	129	....
1922.....	185	228	95	114	116	109	98	135	....
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	408	214	219	170	160	138	234	212
1945									
November....	182	467	188	212	173	173	126	227	235
December....	184	438	197	221	170	174	130	228	223
1946									
January.....	180	363	208	237	171	174	132	226	249
February....	186	339	209	254	173	175	133	223	275
March.....	183	319	225	269	178	179	137	211	283
April.....	190	429	232	279	181	179	126	213	282
May.....	194	430	225	286	210	192	125	220	177
June.....	210	590	211	286	221	197	124	228	185
July.....	249	567	212	313	305	212	126	266	163
August.....	287	486	205	319	280	201	127	262	162
September...	285	488	184	255	269	202	130	256	154
October.....	304	530	175	238	266	213	136	293	151

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.59	5.16
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945						
November	1.75	1.42	7.81	5.77	4.86	6.71
December	1.75	1.42	7.81	5.77	4.86	6.71
1946						
January	1.75	1.42	7.81	5.77	4.86	6.71
February	1.75	1.42	7.81	5.77	4.86	6.71
March	1.75	1.42	7.81	5.77	4.86	6.71
April	1.75	1.42	7.81	5.77	4.86	6.71
May	1.75	1.42	9.08	6.10	4.86	7.30
June	1.88	1.42	10.34	6.42	4.86	7.90
July	1.88	1.42	11.62	8.15	5.34	9.60
August	2.22	1.46	17.15	8.14	6.07	12.14
September	2.22	1.46	10.60	6.95	6.07	12.14
October	2.22	1.46	10.60	6.95	6.07	12.14
Index Numbers (1910-14 = 100)						
1922	113	90	173	132	140	142
1923	112	102	177	137	136	147
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945						
November	65	50	223	163	144	191
December	65	50	223	163	144	191
1946						
January	65	50	223	163	144	191
February	65	50	223	163	144	191
March	65	50	223	163	144	191
April	65	50	223	163	144	191
May	65	50	259	173	144	207
June	70	50	295	182	144	224
July	70	50	332	231	158	273
August	83	51	490	231	180	345
September	83	51	303	197	180	345
October	83	51	303	197	180	345

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1922	.566	3.12	6.90	.632	.904	23.87	....
1923	.550	3.08	7.50	.588	.836	23.32	....
1924	.502	2.31	6.60	.582	.860	23.72	....
1925	.600	2.44	6.16	.584	.860	23.72	....
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.570
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945							
November	.650	2.20	6.40	.535	.797	26.00	.200
December	.650	2.20	6.40	.535	.797	26.00	.200
1946							
January	.650	2.20	6.40	.535	.797	26.00	.200
February	.650	2.20	6.40	.535	.797	26.00	.200
March	.650	2.20	6.40	.535	.797	26.00	.200
April	.650	2.20	6.40	.535	.797	26.00	.200
May	.650	2.20	6.40	.535	.797	26.00	.200
June	.650	2.30	6.45	.471	.729	22.88	.176
July	.650	2.60	6.60	.471	.729	22.88	.176
August	.700	2.60	6.60	.471	.729	22.88	.176
September	.700	2.60	6.60	.471	.729	22.88	.176
October	.700	2.60	6.60	.471	.729	22.88	.176
Index Numbers (1910-14 = 100)							
1922	106	87	141	89	95	99	....
1923	103	85	154	82	88	96	....
1924	94	64	135	82	90	98	....
1925	110	68	126	82	90	98	....
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945							
November	121	61	131	75	84	108	83
December	121	61	131	75	84	108	83
1946							
January	121	61	131	75	84	108	83
February	121	61	131	75	84	108	83
March	121	61	131	75	84	108	83
April	121	61	131	75	84	108	83
May	121	61	131	75	84	108	83
June	121	64	132	66	76	95	80
July	121	72	135	66	76	95	80
August	131	72	135	66	76	95	80
September	131	72	135	66	76	95	80
October	131	72	135	66	76	95	80

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1922	132	149	141	116	101	145	106	85
1923	143	152	147	114	107	144	103	79
1924	143	152	143	103	97	125	94	79
1925	156	156	151	112	100	131	109	80
1926	146	155	146	119	94	135	112	86
1927	142	153	139	116	89	150	100	94
1928	151	155	141	121	87	177	108	97
1929	149	154	139	114	79	146	114	97
1930	128	146	126	105	72	131	101	99
1931	90	126	107	83	62	83	90	99
1932	68	108	95	71	46	48	85	99
1933	72	108	96	70	45	71	81	95
1934	90	122	109	72	47	90	91	72
1935	109	125	117	70	45	97	92	63
1936	114	124	118	73	47	107	89	69
1937	122	131	126	81	50	129	95	75
1938	97	123	115	78	52	101	92	77
1939	95	121	112	79	51	119	89	77
1940	100	122	115	80	52	114	96	77
1941	124	131	127	86	56	130	102	77
1942	159	152	144	93	57	161	112	77
1943	192	167	150	94	57	160	117	77
1944	195	176	151	96	57	174	120	76
1945								
November	205	182	156	97	57	175	121	78
December	207	183	156	97	57	175	121	78
1946								
January	206	184	156	97	57	175	121	78
February	207	185	156	97	57	175	121	78
March	209	187	158	97	57	175	121	78
April	212	188	160	97	57	175	121	78
May	211	192	162	99	57	189	121	76
June	218	196	163	100	60	203	121	70
July	244	209	181	103	60	230	121	70
August	249	214	187	116	67	296	131	70
September	243	210	181	108	67	226	131	70
October	273	218	197	108	67	226	131	70

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Since June 1941, manure salts are quoted F.O.B. mines exclusively.

**** The weighted average of prices actually paid for potash are lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizer

"Agricultural Minerals Registrants to Date for the Fiscal Year Ending June 30, 1947," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-130, Sept. 24, 1946.

"Commercial Fertilizers Registrants to Date for the Fiscal Year Ending June 30, 1947," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-131, Sept. 24, 1946.

"Agricultural Mineral Sales as Reported to Date for Quarter Ended June 30, 1946," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-132, Oct. 11, 1946.

"Commercial Fertilizer Sales as Reported to Date for the Quarter Ended June 30, 1947," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-133, Oct. 11, 1946.

"The Effect of Various Fertilizer and Manure Treatments on the Yield, Size, Stand, and Disease Resistance of Cantaloupes," Agr. Exp. Sta., Univ. of Del., Newark, Del., Bul. 256, Aug. 1945, E. M. Rahn and W. H. Phillips.

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How Guernsey Calves Helped Solve a Feed & Crop Fertilization Problem

(*From page* 13)

both to animal and plant health. Magnesium absorption beyond the optimum point in animals may produce a disease known as magnesium tetany, while overuse of it in the soil shows evidence of lowering the potassium intake of plants and will cause potash starvation. Much is still to be learned about this element but all indications point to a triumvirate relationship existing between calcium, magnesium, and phosphorus in such balance as these elements are found in nature, as, for example, in the egg shells of wild birds.

Corroboration

If this narrative has given you the impression of being a fairy tale, I do not blame you. I have merely set forth the facts as they have appeared at Brookside Farms. More than 30 eminent agronomists and scientists have visited the farm to see and study this peculiar problem. Hundreds of photographs have been taken and loads of soil and plant tissue have been carted away for further research.

I wish particularly to thank Dr. Fred Boyd, Agronomist and Midwest Representative of the American Cyanimid Company and Dr. G. N. Hoffer, Agronomist and Midwest Representative of the American Potash Institute, for their keen interest and active cooperation in this problem. Their on-the-spot analyses of soil and tissue samples have thrown much light on this subject. Their findings will be published after further experimentation is completed. However, it may be safely stated that from the evidence at hand magnesium plays an important role in plant, animal, and human life as do the other better known elements—nitrogen, phosphorus, and potash.

Farm Mechanization in Relation to Cotton Quality & Marketing

(*From page* 8)

(6) Machine-picking has been found to be a more timely method of harvesting than hand-picking when fair weather prevails, since it enables the producer to hold weather damage to open cotton to a minimum. Indications are that this method of harvesting, on a crop basis, will compare very favorably with hand-picking from a grade standpoint and give better fiber quality and significantly higher spinning value.

(7) Progress has been made by gin machinery manufacturers in the development of cleaning, extracting, and drying equipment and in determining combinations of these units most suitable for cleaning machine-picked cotton.

(8) Lint-cleaning developmental work at the U. S. Cotton Ginning Laboratory has indicated promising possibilities for cleaning the lint ginned from machine-picked cotton as the lint is

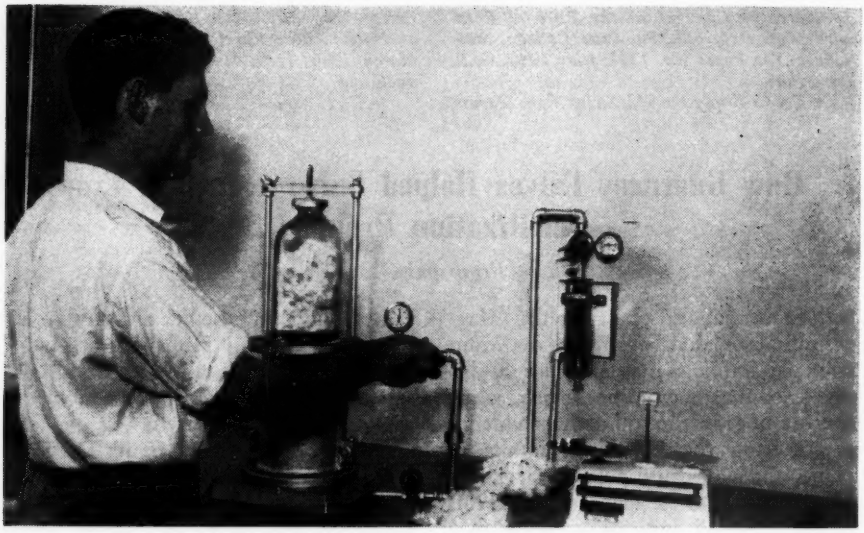


Fig. 4. Determining the quantity and quality of foreign matter present in machine-picked cotton versus that occurring in hand-picked cotton when reaching the Stoneville Laboratory.

blown from the gin saws to the lint flue.

Largely as the result of the Stoneville studies, cotton producers are finding that the first step to take to bring the grade of machine-picked cotton closer to that of hand-picked is to choose a variety of cotton more nearly adapted to mechanical harvesting. Already cotton breeders are taking into consideration these needs in their breeding efforts and are attempting to develop and furnish productive cottons of acceptable fiber quality that will be especially adapted to mechanical harvesting.

Dusting of cotton plants with calcium cyanamid during the harvesting season to cause leaf shedding has been found under experimental as well as practical conditions to facilitate mechanical picking and, at the same time, to reduce the amount of extraneous material in seed cotton. In most tests, defoliation improved the quality of machine-picked cotton from one-third to one-half grade and resulted in corresponding reductions in mill waste during manufacturing. The strength and appearance of yarns manufactured from cotton properly defoliated and mechanically picked have been found to be equally as good as those of yarns made of cotton hand-picked from undefoliated fields.

The development of efficient cleaning machinery for use at gins is considered to be absolutely essential if full economic benefit of mechanical production is to be realized. Several newly developed devices were tried out experimentally in 1944 by gin machinery manufacturers on late-harvested, weather-damaged cotton. The results were encouraging enough to justify the manufacture of a large number of these units for installation and use in gins where machine-picked or roughly harvested cotton was ginned in 1945. All the units are used in combination with drying, cleaning, and extracting machinery customarily used in conditioning and cleaning hand-picked cotton. The new systems this year embrace principally a unit known as the "impact cleaner," a unit designated as the "multi-unit reciprocating cleaner-drier," and some modified or improved designs of overhead extracting machines.

In the light of the developments

here reported, it is evident that mechanization in connection with cotton production in the adaptable areas of this country has great possibilities. In addition to the fact that mechanization offers a means of reducing production costs and of aiding in the maintenance of an adequate return to cotton producers, its widespread adoption as an aid in producing cotton is likely to bring about, or at least to expedite, changes in the handling of cotton from the producer to the consumer. The quality of a cotton crop produced and harvested mechanically will show much less variation than a crop picked by hand. It is conceivable that if adequate machinery is available for economical use over the shortest period during which it is practical to harvest a crop, the bulk of a crop will fall within a very narrow range of grades. This condition would facilitate the assembly of cotton into uniform lots for shipment to consuming establishments and would give spinners a dependable source of supply of uniform quality cotton. It would make it more feasible to maintain the identity of varieties of cotton of high-spinning value. Mechanization will be a factor in reducing the number of varieties of cotton planted in a given area. Thus, sufficient cotton of uniform quality will be available to attract the attenion of agents of textile mills, many of whom now recognize the advantage that pure-variety lots of desired spinning quality have over mixed-variety lots that show abnormal variations in spinning value. Large volume, well-equipped gins will likely be installed at an increased rate as mechanization becomes more generally adopted.

With the trend toward larger-capacity and better-equipped gins, important economies in handling cotton from the farms to the consuming centers are in sight. Economic gains are evident through the adoption of means for improving the appearance of cotton bales and of providing better methods of sampling bales and protecting their contents. Gin compression, especially in the large-volume, centralized gins, is mechanically feasible and affords opportunities for savings in packaging and for improving bale appearance.

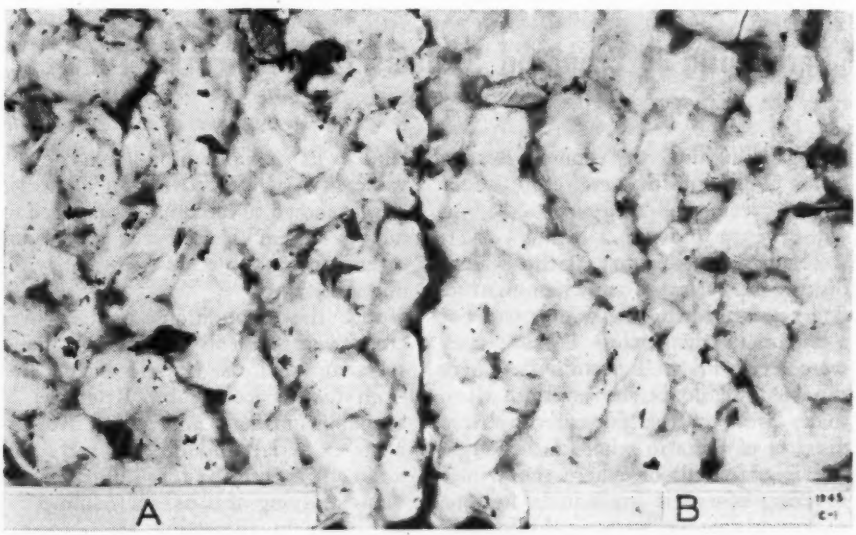


Fig. 5. Mechanically harvested seed cottons from different varieties. Planting of a variety of cotton more nearly adapted to machine-picking, together with plant defoliation, flame cultivation, and improved cleaning at the gins, makes the machine-picked cotton freer of trash than would otherwise be the case.

Alfalfa—A Crop to Utilize the South's Resources

(*From page* 16)

crops do not compare with alfalfa in root absorption area.

High yields of alfalfa result from the extensive root system, the volume of soil in which the alfalfa feeds, and the long growing period. These are some of the reasons why other hay crops yield much less than alfalfa. Kudzu, for instance, grows vigorously during summer months but is killed by frost. With proper fertilization, lime, and borax, stands of alfalfa are maintained and with proper cutting the stand may actually increase annually for a period of years. Therefore, one seeding will last for several years, perhaps as long as desired in order to rotate with other crops.

Consideration should be given to the productive capacity of alfalfa in units of food per acre annually as compared to the removal of raw materials from the soil. For after all, production of crops is simply the manufacture of food by the plant from the raw materials of the soil and the atmosphere. In the manufacturing process, the greater the ratio of raw materials utilized from the air to that taken from the soil, the greater the gain or chance for permanent fertility and profit in the operation. Thus, a crop that utilizes to the fullest extent the N of the air along with the CO_2, water, and energy that are available without cost of depreciation to the farm should yield the greatest returns to the farmer.

The fertility problem is one of resupply of mineral nutrients removed from the soil by crops and crop management in adapting crops whereby the raw materials of nature are manufactured by plants into farm products. The over-all problem is that of efficiency —the utilization of the energy and nutrients provided by nature and available in the soil and air. Alfalfa, perhaps, more nearly utilizes these advantages in the Southeast than any other crop and these facts should be considered by agricultural leaders in planning the farm program.

Fertilizing & Cropping Systems for Flue-cured Tobacco

(*From page* 24)

spring ploughing was done. Results from ploughing the rye crop under when green, followed by reseeding with rye to provide a winter cover, were not as satisfactory as those from disking the crop down when mature. Soil erosion during the winter was not a factor in these plots because they were level and well protected. There can be little doubt, however, that, on many areas in the flue-cured tobacco districts of Ontario where fall ploughing is practiced, or where the winter covering of rye is inadequate for one reason or another, losses in the form of fertility and topsoil owing to soil drifting and washing away are such that it is virtually impossible to restore the land to its previous productivity. The value of a winter covercrop of rye is clearly shown in the results compared in table 5 where tobacco was grown for seven consecutive years with and without cover crops.

Under these conditions winter cover crops were evidently responsible for a substantial increase in yield and returns from the tobacco crop. Retention of available nutrients and addition of organic material undoubtedly were factors contributing to this improvement.

In studying the use of commercial fertilizers in increasing the effectiveness of rye for use in the tobacco rotation, some worthwhile possibilities have appeared. As nitrogen is exceptionally

TABLE 6.—AVERAGE YIELD AND GROSS RETURNS PER ACRE WITH FLUE-CURED TOBACCO IN ROTATION WITH RYE FERTILIZED AND UNFERTILIZED WITH COMMERCIAL NITROGEN.

Fertilizer Treatment per Acre on Rye	Yield per Acre Lbs.	Returns per Acre $
No fertilizer.....	1,212	306
16 pounds N per acre at time of disking mature rye.....	1,261	321
32 pounds N per acre at time of disking mature rye.....	1,294	319
Five tons barnyard manure at time of disking mature rye..	1,322	333

low in these soils most of the early tests dealt with the effect of applying this nutrient on the rye crop. Some interesting effects on tobacco grown in two-year rotations with rye fertilized and unfertilized over a six-year period are presented in table 6.

The tobacco crop showed a distinct response to nitrogen applications made on the rye in this test, indicating the beneficial effect of increased growth of rye returned to the land. This response was in accordance with data previously published here which showed that the addition of organic materials either in the form of cover or rest crops turned under, or manure applied, was reflected in increased yields of leaf. Lower grades following the higher rate of nitrogen fertilization on the rye suggested an unsatisfactory balance between this nutrient and others, notably potash. As barnyard manure normally contains considerable available potash in addition to nitrogen and phosphoric acid, it is not surprising that the response in growth and quality of tobacco was greater following the applications made in this test. Increased growth of rye following applications of nitrogen was striking, the response to the higher rate being noticeably larger. There was, however, little evidence of improvement in growth of rye where barnyard manure was applied.

Results obtained in this preliminary study paved the way for considerable investigation on the whole subject of fertilizing cover and rest crops of rye in the flue-cured tobacco rotation. Although this work is still in progress, it has advanced sufficiently to show certain definite indications. Notable among these is the additional response in growth of rye that may be obtained by supplying muriate of potash along with a source of commercial nitrogen. Under average local soil conditions a response in growth of rye is not noticeable when muriate of potash is applied alone. When the rye on areas that receive 50 pounds per acre of nitrogen is compared with that on which 50 pounds of potash per acre are supplied in addition to the nitrogen, the increase owing to added potash appears equal to that from the nitrogen alone. As might be expected, the tobacco crop responds in the form of heavier yields of higher grade leaf from the improved balance of potash to nitrogen. Responses to phosphoric acid have not been clearly indicated. There are indications, however, that the application of 10-3-10 commercial fertilizer at the rate of 500 pounds per acre when disking under mature rye straw about August 1 may prove as effective in improving the tobacco crop that follows as five tons of barnyard manure per acre, which contains about an equivalent amount of plant food.

The effectiveness of growing and fertilizing rye as a soil-building practice depends on how good the rye crop is and how it is managed. A reasonably good seedbed is worthwhile for rye. Disking after cutting the stalks is useful in getting a good stand when rye follows tobacco, but the importance of seeding as soon as possible should not be overlooked. Varieties of rye vary in their suitability and Horton is an outstanding variety for use on these soils. This variety makes more rapid growth in both spring and fall and is

among the heaviest yielders of straw and seed. Drilling the seed at a fairly heavy rate is worthwhile. Where the soil is in a very low state of fertility, a light application of fertilizer, high in nitrogen, will improve the growth; otherwise fertilizer is more efficiently used at time of disking in the mature straw. Combine-harvesting is advisable when the price of rye warrants, provided sufficient seed is either left or reseeded to ensure a good cover crop. Commercial fertilizer, high in nitrogen and potash, should be broadcast before disking the straw. Under average soil conditions it is advantageous to use an application containing 50 pounds of nitrogen per acre and an equivalent amount of potash. Delay in disking or reseeding after the rye is mature should be avoided, in order to allow as much time as possible for the rye to grow before winter. Fall ploughing is a wasteful practice on flue-cured tobacco land. Much of the advantage of seeding and fertilizing rye is lost if the soil is left bare during the winter and early spring. Furthermore, tobacco crops benefit from a few inches of new rye growth turned under in the spring.

It is apparent, both from the standpoint of organic matter upkeep and root rot control, that the maintenance of productivity in these soils is going to require adopting a longer rotation than is presently practiced. The fact that most flue-cured tobacco farms are equipped and capitalized on the basis of a crop of tobacco on each acre of crop land every second year will retard such a change. Scarcity of suitable land for growing this crop is frequently advanced as an excuse for such intensive cropping. It may be safely stated, however, that land of suitable type in satisfactory climatic zones of Ontario is not sufficiently limited to warrant destructive soil management. To assume the contrary would be one of the most serious errors that could be made.

Simply lengthening the rotation is, in itself, not an effective means of improving the situation. A suitable rotation should provide for methods of fertilizing and growing crops that ensure good stands and yields so that large amounts of stubble and other crop remains may be returned to the land. The return of all crop refuse either directly or in the form of barnyard manure is of the utmost importance to the continued economic use of flue-cured tobacco soils

Fertilizer high in nitrogen and potash disked with the rye straw promotes its decomposition and benefits the following rye cover crop.

The absence of a cover crop on this field is poor farming practice.

in Ontario. When mature crop residues, such as straw or corn stalks, are incorporated it is advisable to apply commercial nitrogen to aid in their change to humus and thus stimulate growth of the crop that follows. Where the nitrogen content has been increased by the growing of legumes or the addition of commercial materials, the potash supply is likely to be too limited for normal growth of flue-cured tobacco and other crops, unless provision is made to furnish additional potash as well.

The very characteristics that make these lighter soils suitable for the growing of flue-cured tobacco render them vulnerable to destruction by many of the practices that are presently followed in its culture. Only by adequately protecting them against the weather, replenishing their organic matter, and keeping them free from plant diseases, can their usefulness be insured.

A Discussion of Soil Analyses . . . . of Texas

(*From page* 20)

Heavy soils of the Gray Prairies, Coast Prairies, Red Lands of east Texas, and soils of the large river bottoms will need a higher level of available plant nutrients. These soils have high exchange capacities and are inherently more fertile. Heavy soils of the Trinity River should have 80 to 100 p.p.m. available phosphorus and around 200 p.p.m. available potassium, while sandy bottom land soils should have 50 to 60 p.p.m. of available phosphorus and 100 to 130 p.p.m. available potassium.

Applications of plant nutrients for production of crops to be used in feeding beef animals and dairy animals should be different. Dairy cattle, because of their heavy use of costly concentrates to produce milk, can offset the higher cost of fertilization when forage of a higher quality is obtained. The applications of these plant nutrients can be brought about in two ways—heavier application or more frequent application. Meadows, where all forage is removed, should be fertilized more often than pasture land. In the vicinity of Madisonville, Texas, virgin grassland

or meadow which has been mowed at least twice a year for 15 years on a deep, fine-textured, very slowly permeable soil of the Gray Prairies has less available plant nutrients than cultivated land adjacent where the fertility has been maintained by good soil management.

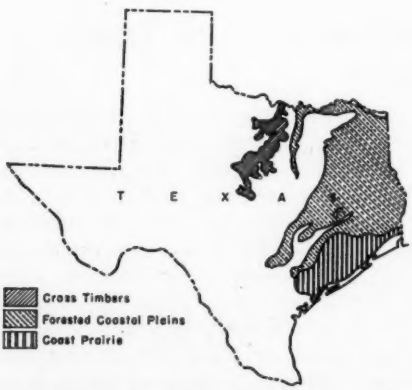
Lime was required by 61.6 per cent of the Forested Coastal Plain soils, or 205 of the 333 samples. Limestone was applied to raise the base saturation of pasture lands to 75 per cent, or to raise the exchangeable calcium. Where base saturation was high and replaceable calcium was low (less than 500 p.p.m.) on Forested Coastal Plain soils 1,000 pounds of limestone were applied. On deep sands the maximum lime recommendation is 1,000 pounds limestone. This has proven to be most economical due to the low exchange capacities of sands. The maximum application of plant nutrients on Forested Coastal Plain pasture soils is 100 pounds (phosphorus), P_2O_5; 50 pounds (potassium), K_2O; and 16 pounds (nitrogen), N. This has been proven by practical field tests.

Many samples of the Coastal Prairie soils have been analyzed, but only 24 have been used as representative, because many of the analyses were made for other purposes. Forty-six per cent or 11 of these soils require lime. Many of the sandy and gray heavy soils east of Fort Bend County require calcium, while those soils west of Fort Bend County, particularly the heavy soils, do not. The soils in the eastern portion of this area are deficient in phosphorus, potassium, nitrogen, and calcium. Applications of 120 pounds P_2O_5, 70 pounds K_2O, and 16 pounds N, and three tons of limestone have been recommended for pasture development. The soils in the western portion of this area are, as a whole, deficient in phosphorus; some need both phosphorus and potassium. Potassium content increases from east to west, as does the base saturation and soil reaction.

The plant-food nutrient level of soils in the Cross Timber area is higher than that of Forested Coastal Plain soils. These soils are deficient in phosphorus and nitrogen. Applications of potash are also needed, but less is required than in the Forested Coastal Plain. The base saturation is often high, though replaceable calcium may be low. This may be caused by a high sodium saturation. Occasionally small applications of lime are needed; the maximum application recommended is 1,000 pounds limestone.

None of the soils analyzed from the large river bottoms needed lime. This is due to the origin of the soil material. These soils are quite variable, especially in available phosphorus content. They are consistently low in available potassium. Some require heavy applications of phosphorus.

The farmer-cooperators of the soil conservation districts who know the analyses of their soils are in position to proceed with necessary fertilization. That step, and every other one aimed at completing installation of dovetailing soil conservation measures to control erosion and improve soil productivity, is a carefully planned one for the conservation farmer. It should be. The farmer's entire basic capital—his topsoil's ability to yield profitably—is at stake.



Three basic land resource areas. Shown are the Coastal Prairie, the Forested Coastal Plain, and the Cross Timbers. In these locations the 500 soil analyses of the Soil Conservation Service Operations Laboratory at Temple were made.

Hugh Bennett's Homecoming

(*From page* 26)

To freshen Dr. Bennett's memory of his farm youth, they took him to the two-story plantation home where he was reared and to the two-room building that once housed Gould's Fork Academy where he first attended classes. At the Bennett farm, "Uncle" Sim Bennett, 80-year-old former farm hand on the plantation, revived more memories. So did a mule race, a visit to a farm fish pond where boys were swimming and boating, and a steaming bowl of turtle stew made from Brown Creek snapping turtle.

Not until that night did they give Dr. Bennett a chance to speak, and that was after a Southern barbecue at the Wadesboro Country Club. Then he said:

"I am accepting in the fullest personal sense this interest of yours and your kindness and hospitality, even though actually, and properly, you are paying tribute to a movement: Conservation of soil and water, a movement the objective of which is the welfare of the community and each individual in the community.

"I don't know," he continued, "anything about how people who are honored as you have honored me today are normally affected by this sort of thing; but, as for me, this kind of expression of one's life-long friends is deeply touching . . . Perhaps the best thing is to change the subject."

From there on out, his talk to his homefolks was the kind of fighting soil conservation speech he has been making all over the United States and in many foreign countries for nearly three decades.

Dr. Bennett told them that "we have moved ahead in the United States from the unenviable position of wasting our basic resource of productive land at a faster pace than any nation or race that we know about, civilized or barbaric, up to the position of world leadership in the field of soil and water conservation."

His next word was one of warning: "Don't misunderstand me. We are not at all satisfied with present progress; we are still losing every year something like 500,000 acres of cropland by unnecessary soil erosion.

"But, and this is important, we do have a going program and we have learned a great deal about how to get the job done. The trail has been blazed; we are on the way. Last year, for example, we did more conservation work than in any previous year, even with shortages of technicians, machinery, and so on. This year our goal is to double last year's output; the prospect for that looks good. And then, next year, we are going to do our best to double that accomplishment again. If we can do that, and I think we can, we really will be getting along with the prodigious job of safeguarding more than 700 million acres of crop, grazing, and other kinds of land needing protection."

Dr. Bennett told his audience that the best farmer device yet invented for dealing "first-hand, effectively, and democratically with the matter of taking care of our agricultural land" is the soil conservation district, the first of which was the Brown Creek District, organized in 1937.

"These districts are subdivisions of state government for soil conservation and good land use," the chief soil conservationist explained. "They are brought into existence through the vote of the farmers themselves and are operated within their locally-established boundaries by the farmers through their elected officers."

Today, he said, all 48 states and Puerto Rico have soil conservation district laws, or similar legislation, that permit landowners to create districts. There are now 1,650 districts covering

900 million acres and 4 million farms—two-thirds, Dr. Bennett said, of all the farms in the nation. His Soil Conservation Service assigns technicians to the districts, at the request of the farmer supervisors, to aid individual landowners to plan, apply, and maintain complete farm soil conservation systems. Last year, he reported, "We planned, in soil conservation districts, 20½ million acres and finished the job of putting conservation practices onto 13½ million acres of land in 1945."

Appropriately, the assignment made to Dr. Bennett for his talk was to discuss "Soil Conservation—A Dream Coming True." To him his work is exactly that—a dream coming true.

Born on his father's plantation near Wadesboro in 1881, Bennett studied geology at the University of North Carolina and received a Bachelor of Science degree in 1903. Almost immediately thereafter he went to work for the Bureau of Soils of the U. S. Department of Agriculture. His first assignment was temporary, to field survey duty. But young Bennett liked it so well that he asked to be kept in this job.

In 1905, as a member of a soil survey party in Louisa County, Virginia, Bennett first discovered the cause and true significance of soil erosion.

From that point on, his life became a veritable crusade for conservation, although often it was uphill going. Wherever his soil survey work took him he bolstered his discovery that good land—and the people on it—were being made poor by erosion. For example, in 1910-11, his survey of Fairfield County, South Carolina, showed that 28 per cent of the county's land had been so damaged by erosion that it had no further practical value for any immediate cultivation, that another 16 per cent had lost most of its topsoil.

When the Fairfield County report came off the press, Bennett expected the public to begin clamoring for action to save the land.

But nothing happened. In Bennett's own words, the report, one of the first quantitative measurements of the effects of soil erosion, "didn't even ripple the placid surface of national complacency with respect to the welfare of the land."

It taught the young soil conservationist that people still weren't interested, but it didn't discourage him. He kept on fighting for erosion control, soil improvement, and good land use. But Bennett was faced with such contemporary, published statements as this:

"The soil is the one indestructible, immutable asset that the nation possesses. It is the one resource that cannot be exhausted; that cannot be used up."

"When I read this," Dr. Bennett once said, "I learned that it was possible to pack a lot of misinformation in two short sentences, even when the statements carry the full resounding ring of what is sometimes referred to as eloquence."

As Bennett continued his evangelistic crusading for soil conservation, a few other people began writing a little and talking a lot about the subject of soil erosion.

Gullies like this . . .

. . . have been healed by rank-growing, forage-producing kudzu.

"Finally, after a long time, there was begun in the U. S. Department of Agriculture an educational campaign on the subject," Dr. Bennett recalled. "Among other things, we published a bulletin called 'Soil Erosion, A National Menace.' Some of the newspapers and an occasional agricultural journal printed extracts from our educational material. Later, some of the magazines began asking for articles on the erosion problem and what to do about it."

In 1928. Bennett presented to a congressional committee handling Department of Agriculture appropriations the whole national problem of land damage by erosion and his recommendations for getting a nation-wide soil conservation program started. The resulting Buchanan Amendment provided federal funds for regional erosion stations to measure the rates of soil and water losses, to make surveys to determine the extent of damage by erosion and locate the principal affected areas, and to work out methods of control.

"It was not long before overwhelmingly convincing information was acquired in quantity at these stations," Bennett said. "For example, at the 10 stations established on 10 very important types of farm land scattered throughout the country more than 200,000 quantitative measurements were quickly made of soil and water losses under different conditions of land use. In rapid order, estimates were thus replaced with measured facts."

And the "measured facts" showed that some of Bennett's earlier estimates of land damage, which had been criticized by a few papers, actually were underestimates.

"With the new information," the chief soil conservationist continued, "it was possible to say, for example, that every year enough soil was being washed out of our fields and pastures to load a train of freight cars that would encircle the earth 18 times at the equator. Nobody challenged that statement, even though it was much larger than any preceding estimates."

The next action, resulting from Bennett's campaigning and that of the other people then aroused, was the Soil Erosion Service created in 1933 in the U. S. Department of the Interior. Quite logically, Bennett was made chief of this first organization to attack soil erosion on a nation-wide basis. But the Soil Erosion Service was a temporary outfit, designed to help relieve unemployment as well as to demonstrate erosion control and good land-use methods in cooperation with landowners.

With the findings of the erosion experiment stations and the results of the Erosion Service before it, the Congress in 1935 created the Soil Conservation Service as a permanent agency in the U. S. Department of Agriculture. This new agency, with Bennett as its chief, replaced the Erosion Service.

Under Bennett's guidance, the Soil Conservation Service expanded and speeded the erosion control demonstrational work.

"Back during the demonstrational period," Dr. Bennett recalled, "some of us came to feel that soil conservation work could be speeded up by giving greater responsibility to farmers. It was

further felt that inasmuch as farmers own and control the land needing conservation and must therefore have the final decision as to any work carried out on their own lands, they should direct the program. That is why—at least some of the reasons—the soil conservation district plan was conceived and developed."

Dr. Bennett's soil conservation work has carried him to nearly every county in the United States, to Alaska, Cuba, the Canal Zone, Venezuela, to South Africa. Today many lands, at least 30 of them, are taking up the national pattern of soil conservation he helped to cut. And a steady stream of agricultural leaders from other countries flows through his Washington office and into soil conservation districts throughout the nation seeking information that will help them conserve their own land resources. In recent months they have come from India, South Africa, Australia, Dutch East Indies, Belgian Congo, Brazil, Mexico—just to mention a few.

Bennett the man is colorful, untiring, ever-enthusiastic about soil conservation and good food. Around his home town his liking, and great capacity, for turtle stew, catfish stew, collards and fatback, sorghum molasses, and fried chicken—foods he ate as a boy—are legendary.

As was said of him at the Wadesboro homecoming, Dr. Bennett has never shaken "from his shoes the mud of Brown Creek. He is one with the Land of the Tar Heel. A club woman, confused as to names, once referred to him as 'that interesting speaker, Mr. Clay.' Congressional committees know him as a unique Washington administrator who talks farmer-language while explaining soil conservation in terms of specialized machinery or lespedeza bicolor honey which he lugs to the hearings."

Although his friends have seen him get his fill of good Southern cooking, they never expect to see him satisfied about soil conservation, at least as long as any soil is being wasted needlessly.

And Dr. Bennett himself said as much at Wadesboro in September:

"Experience during the nine years' time since soil conservation districts came onto the American agricultural scene shows that almost every farmer who adopts the planned, acre-by-acre soil conservation way of farming becomes himself a missionary for soil and water conservation. What a gratifying thing this democratic, 'grass roots' leadership in soil conservation has become! What a tremendous force it is for the future prosperity of our American agriculture!

"I hardly need tell you that, personally, I'll not be content until that farm leadership, and the applied soil conservation it represents, have reached into every county in the United States and to every acre of cropland, pasture land, farm woodland, and idle land. I pledge my continued, undivided efforts, and those of the Soil Conservation Service which I represent in helping to bring this about."

Sundry Other Sundays

(*From page* 5)

As the raw years of reality went by us, however, some of that gloss and glamour left us, yielding to a glowing solace we shared in church with our children—whom the minister put to sleep much faster than could we. The washing of smudgy faces, the putting on of pretty ironed frocks that Mother made, the blacking of scuff-toed shoes, the passing out of pennies for clutching stubby hands to hold, the last rehearsal of the lesson text, the loading of chattering youngsters in the ancient family ambulator, and a last look at

the basting of the roast—all this meant just another Sunday.

That one and many others like it have been, are now, and will continue to be one day of the week which is anything but an "idle" one. To this credo all the lucky pairs who are burdened and privileged with parenthood can say "amen."

Christenings were "high water" marks in our Sabbatical calendar in family rearing times. I had seen numerous infant initiation ceremonies from the sidelines before the auspicious hour arrived when the Missus and me had to prance forward ourselves—she holding the shawls and blankets and I clutching the baby, to face the font in that ageless ceremonial.

Some pastors do this job as a perfunctory routine, showing no gleam of interest in the prodigy held up for sanctification and holy blessing. If the infant is restless and fretful the dominie hurries to get the irksome task performed, solemn and bored with it all. Some other more sympathetic preachers add a touch of poetic dash to the baptism. One minister I knew used a rose dipped in the font to sprinkle dewy petal drops on the upturned fuzzy head; and another had the audience stand to welcome one more citizen of the Kingdom. I was not worried much on such occasions about our baby not being jovial and smiling, because whenever it looked at me it couldn't help laughing out loud.

FROM the baptism font it is but a short step to the bier and the funeral sermon. In the course of life's channel some well-loved ships eventually sail beyond your visual horizon to rest at last in that "much-desired haven." It is not at the funeral service in my experience that the real sense of vacancy and loss most painfully intrudes. I have on two occasions sensed the sharpest reactions upon attending service at the familiar place of family worship, to feel that all these brave words of faith and courage voiced in earthly prayer and song were now a great mystery no longer to some of those we "have loved long since, but lost awhile."

They are living henceforth in a far country while we abide in the waiting-room checking over timetables and spending our money on trifles to amuse or sustain us until the outbound Skymaster lands to take us aboard. And when the preacher reads the favorite psalm of one whose pew is vacant at the church and whose chair is unused at the table, I am as the Roman centurion said, "almost persuaded to be a Christian."

STRAINS of Jingle Bells amid holly wreaths and colored paper garlands arouse memories of a more cheerful, robust, and warming kind—those weekday and Sunday programs to celebrate another happy Christmas. Here we lead double lives—that of the child in its thrills over a poorly disguised plumber acting Santa Claus and that of the parents and grandparents bemused and restored by the same jolly old traditions which have hallowed our churches and homes at each and every year's conclusion.

It's a strange glowing mixture of caroling voices, lighted candles, tinsel, rustling paper, kitchen spice aromas, crunching snow, frosted fingers, and warm hearts. In that mood I have written Christmas greetings through these kindly pages for over twenty years, and that too is a treasured gift to me. In sooth we've been together now for a long series of Sundays.

Another momentous event was when the church held its district convention of elders, deacons, and ministers of grace in our own home town. Bear in mind that although every hotel in town sent busses to meet every one of our four trains daily, they never carried back any of the church dignitaries to register and regale themselves with two-dollar-a-day board and room. Every home which belonged to our church and some of other creeds opened their doors more or less heartily to the hand-

shaking host of earnest believers. Women took down their best family plate and killed countless backyard poultry for the sacrificial spreads. They lasted for a week, including one big Sunday mass meeting with the Bishop Himself in the "big bear's chair" flanked by presiding elders in the little and middle-sized ones on the rostrum behind the carved oak pulpit.

AT one such conclave of the godly I recall that our house sheltered and sustained five good-sized preachers at one lick. Father had a vacation from saying grace all week but it cost him something for the respite. It was like a perpetual communion of the saints, and me an unworthy but always hungry participant.

I also recall that I was disappointed over the sermon by the bishop, expecting to hear a combination of John the Baptist, Henry Ward Beecher, and Bill Sunday. Instead he spent most of the long discourse on ways and means of financial, rather than spiritual, salvation. He had to. It was his job. But I never realized before that it took more than Sunday-school nickels to enable our church to maintain itself as "a rock in a barren land" in competition with a whole lot of other rocks.

Although these sacred seances seemed long to the householders who provided the provender, there were other events like protracted meetings and revivals which took a month or six weeks to run their course, depending on the rapidity with which sinners thawed out. For them, however, no army of talent was required. Our elders merely hired some professional evangelist and a song-leader to serve nightly as spearheads for a general and continual awakening, which would give the old devil no chance to ply this trade on the vulnerable six days of the week among our witless flock.

Unfortunately, I came along on the church roster after the white heat of the jumping and heel-cracking power wave had subsided. That was part of the ferment and the release of those who braved the wilderness and who attended crude camp meetings to sit on hard log benches through four hours of sin-chasing rhetoric. My folks lived in that raucous era and saw many converts writhing and foaming at the mouth. By my time the church had decided to eschew all circus maneuvers and stick to a more decorous and becoming kind of conversion. I really presume it stuck just as long anyhow. I am sure my parents lived the sort of lives that needed no acrobatics and dementia praecox attacks to nail it down for keeps. Aside from watching Baptist immersions and wondering if maybe the minister might lose his grip or hold them under too long, I got few thrills out of the revivals—compared to what went on before.

For a time at different periods it was my privilege to take charge of the Sunday-school tutelage of young boys. Naturally these assignments came because there were no talented scriptural scholars available, so I was drafted. I managed to hang onto the job by promising to accompany the boys on cross-country jaunts on Saturdays, in which I confess we all showed more enthusiasm than for the sessions on Sundays.

IN winter it was not so hard to pin them down to business, but after the sap began to run and the songbirds returned and the "voice of the turtle was heard in the land" the pupils and their pennies alike dwindled. I suspect that a careful count of the congregation would have disclosed a similar falling away on the part of the parents, whose holiday motor-outings had as much to do with the sudden drop in class attraction as I did myself.

Finally as a burst of genius I decided to take the urchins out on the church lawn for their Sunday instruction—if you flatter me by so calling it. The biggest boy, who always collected the offering, made his usual rounds without delay, handed me the small

envelope, and seemingly at a signal, the whole outfit jumped around like rabbits, bounded over the hedge in a jiffy, and disappeared around the corner. I took it with stoical fortitude, comforted by certain frequent references anyone may read in the Songs of Solomon and the Psalms of David praising the beauty of nature and the charms of fair meadows.

FOR to me it is quite evident that one lone man and some stuffy books and maps, however vital such documents may be for good deportment, have little to offer those who are blessed for the time with vibrant youth, impatient minds, and restless feet. I also hold that there is a cathedral-like quality to dense woods and filtering sunshine, and that many species of birds are capable of outdoing our Sunday-school organist. I could never have filled the stern role of a dour Scotch "kirk man" whose scowls and admonitions were benumbing and chastening reproof to all kinds of fractious Sabbath levity.

As one stands reverently in old historic churches which have at various times been distinguished as the meeting places of the Good and the Great, it is not so hard to recapture some of the moods and manners of those bygone times. I have on sundry such occasions been prone to conjecture what our country would have been or would be now were there no churches, leaving us only a town meeting, a political rally, or a picture show to inspire courage and confidence in our present and our future destiny.

Regardless of what creeds we prefer or to what preacher we can listen the longest without nodding, we must admit that were it not for these customary Sunday institutions to break our weary routine, it would not be possible at all for me to say to you right heartily, as I do say now: "Merry Christmas"—and to have you recognize it as the password of sincerity, decency, and good will.

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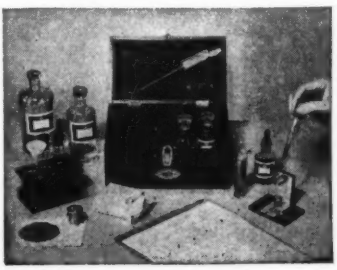

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ENCOURAGING

He: "I suppose I'm only a little pebble on the beach of your life."

She: "You might stand a chance if you were a little boulder."

Sambo—"Boy, whut does you all think about dis heah sex business dey's argufyin' 'bout?"

Mose—"Son, ah thinks a man has got a puffick right to belong to any sex he wish."

CHANGED

A minister congratulated a lady on her silver wedding anniversary for living twenty-five years with the same man.

"But he is not the same man he was when I first got hold of him," she replied.

Mother: "I hope that your roommate at the training school is a nice boy, Robert."

Robert: "Judge for yourself, Mom. The other night he barked his shins on a chair in the dark, and I heard him say, 'Oh, the perversity of inanimate objects!' "

He: "Do you object to petting, Mehitabel?"

She: "That's something I've never done, Joshua."

He: "Petted, Mehitabel?"

She: "Objected, Joshua."

"Look here, waiter! This is supposed to be oyster stew, and I haven't found a single oyster yet!"

"Sir, if you had Irish stew, would you expect to find an Irishman in it?"

"Who was that lady I saw you outwit last night?"

Sailor: "Drinking makes you look beautiful."

She: "But I haven't been drinking."

Sailor: "I have."

PRELUDE

Wife: "Darling, aren't those chimes beautiful? Such harmony! Such a lovely tone!"

Husband: "You'll have to talk louder, honey. Those damn bells are making such a racket I can't hear a word."

First Boiled Citizen: "Do you know the time?"

Second Boiled Citizen: "Sure."

First Boiled Citizen: "Gee, thanks."

A Negro spinster of uncertain years decided at long last to join the Baptist Church. As the deacons plunged her into the river the first time she gasped "I believe." The second time she chattered, "I believe." A third time, gulping for air, she sputtered, "I believe." One of the elders interposed: "You believe what, sister?" She eyed him savagely: "I believe you stinkers are trying to drown me."—Ex.

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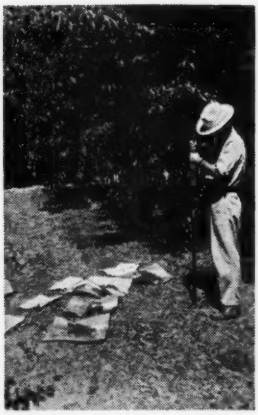

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THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

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